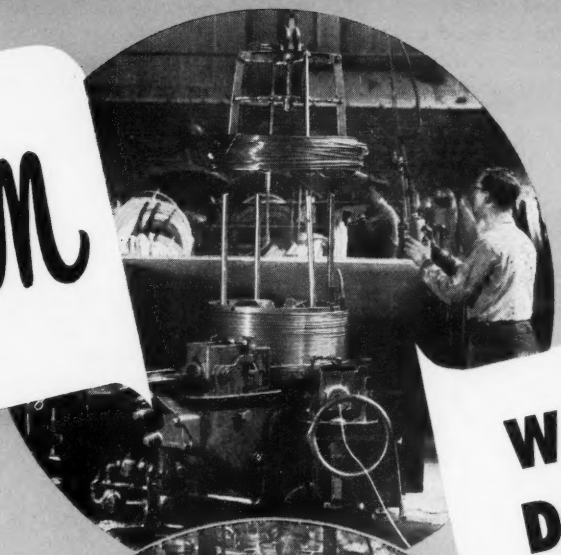
WIRE AND WIRE PRODUCTS

MARCH 1949

Vaughn



WIRE DRAWING MACHINERY

FOR HIGH VOLUME WIRE PRODUCTION

with BASIC VAUGHN ECONOMY IN OPERATION

"Quick on the Draw!"
VAUGHN MACHINERY
PROFITABLY USED BY LEADING WIRE MILLS SINCE 1871

WRITE FOR A CONSULTATION!

THE VAUGHN MACHINERY COMPANY
CUYAHOGA FALLS, OHIO, U. S. A.

COMPLETE COLD DRAWING EQUIPMENT—Continuous or Single Hole . . . for the Largest Bars and Tubes . . . for the Smallest Wire . . . Ferrous, Non-Ferrous Materials or their Alloys.

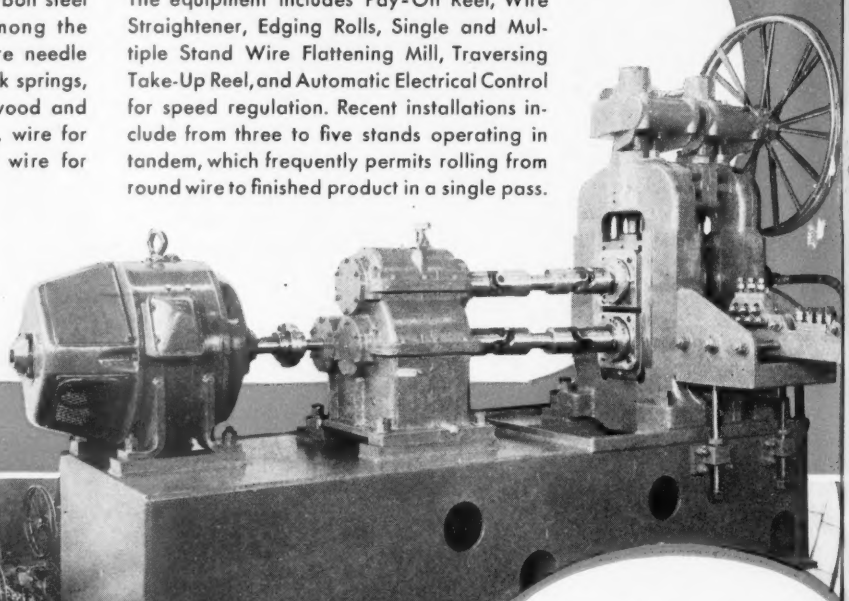
OFFICIAL PUBLICATION OF THE WIRE ASSOCIATION

WIRE FLATTENING

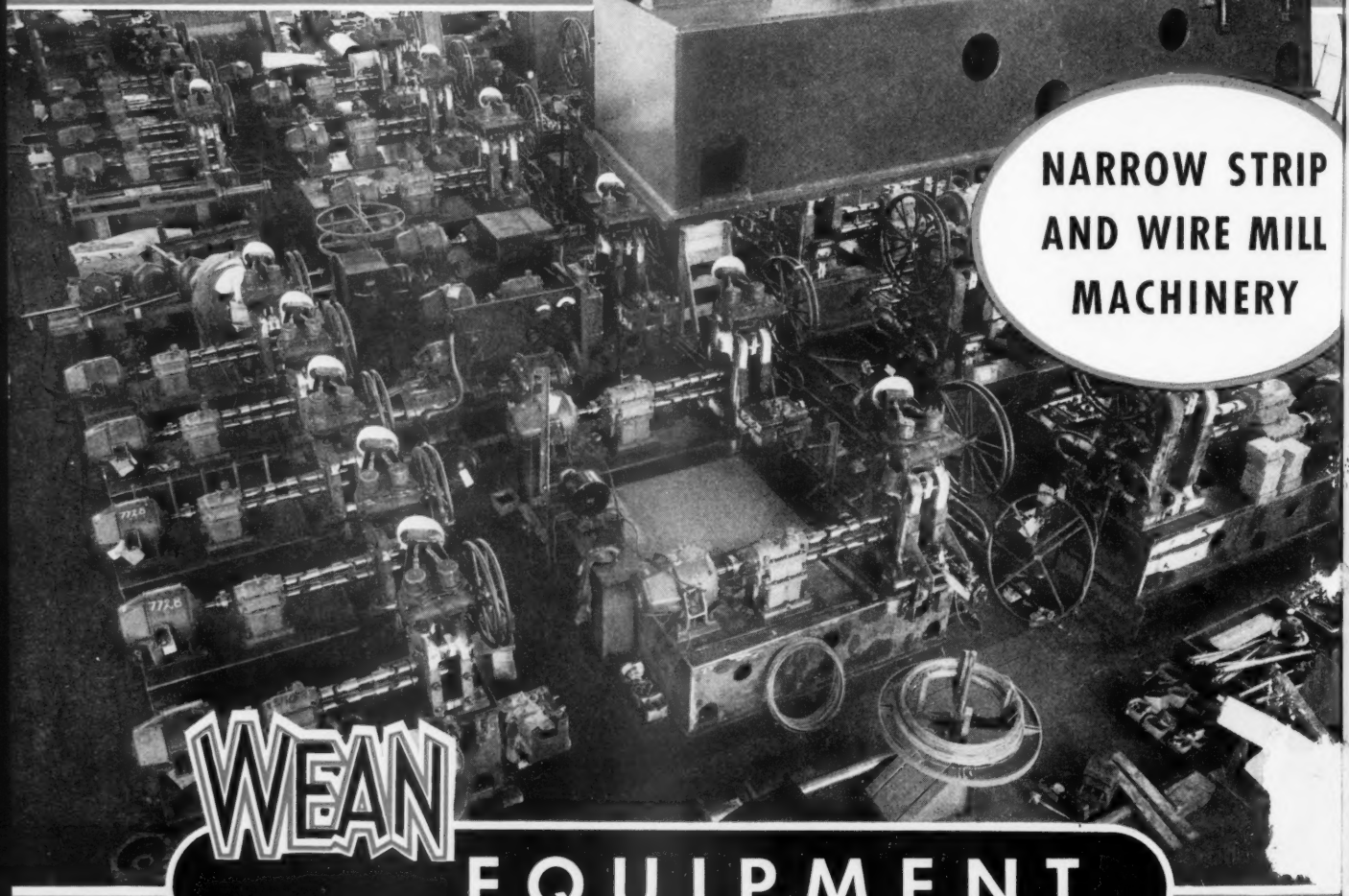
• The cold rolling of round wire in Wire Flattening Mills is an important production Process for producing flat and rectangular cross section wire to closely controlled tolerances in thickness and width. The process is applied to both low and high carbon steel wire and to non-ferrous wire. Among the products produced in this way are needle wire, spring wire for watch and clock springs, umbrella wire, fret-saw wire for wood and metal working, book-binding wire, wire for special steel springs, and copper wire for electrical coils

Wean Equipment Corporation has developed completely modern mills and annealing equipment for this purpose, designed and constructed to produce smoothly finished flat wire of excellent uniformity at high speed. The equipment includes Pay-Off Reel, Wire Straightener, Edging Rolls, Single and Multiple Stand Wire Flattening Mill, Traversing Take-Up Reel, and Automatic Electrical Control for speed regulation. Recent installations include from three to five stands operating in tandem, which frequently permits rolling from round wire to finished product in a single pass.

8" Single Stand Wire Flattening Mill with Wire Straighteners



General view (20 Mills on assembly line)



NARROW STRIP AND WIRE MILL MACHINERY

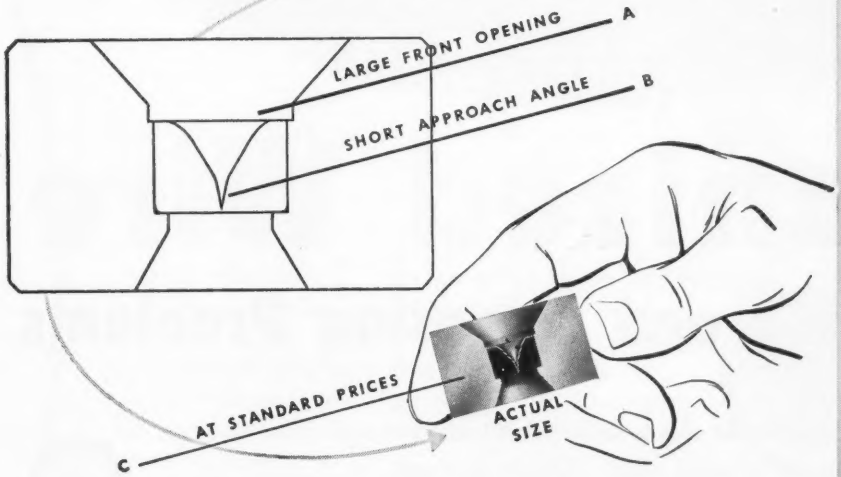
WEAN EQUIPMENT Corporation

22800 LAKELAND BLVD. • CLEVELAND, OHIO

USE CARBOLOY'S IMPROVED

R1.004" DIE

to draw fine steel wire!



ANOTHER Carboloy quality-tested wire die.

This improved .004"-cored die is available, like the rest of Carboloy Company's complete line, through any one of our many, conveniently located Sales and Service Offices. Check over the advantages its special design offers you.

Three big advantages

A. Look at the large front opening! It means easy *accessibility* for you —more and better lubrication.

B. See the *short approach angle!* Less time needed to finish dies—and for repolishing and servicing.

C. And it's yours at *standard* prices, in stocked casing size 1" x ½"!

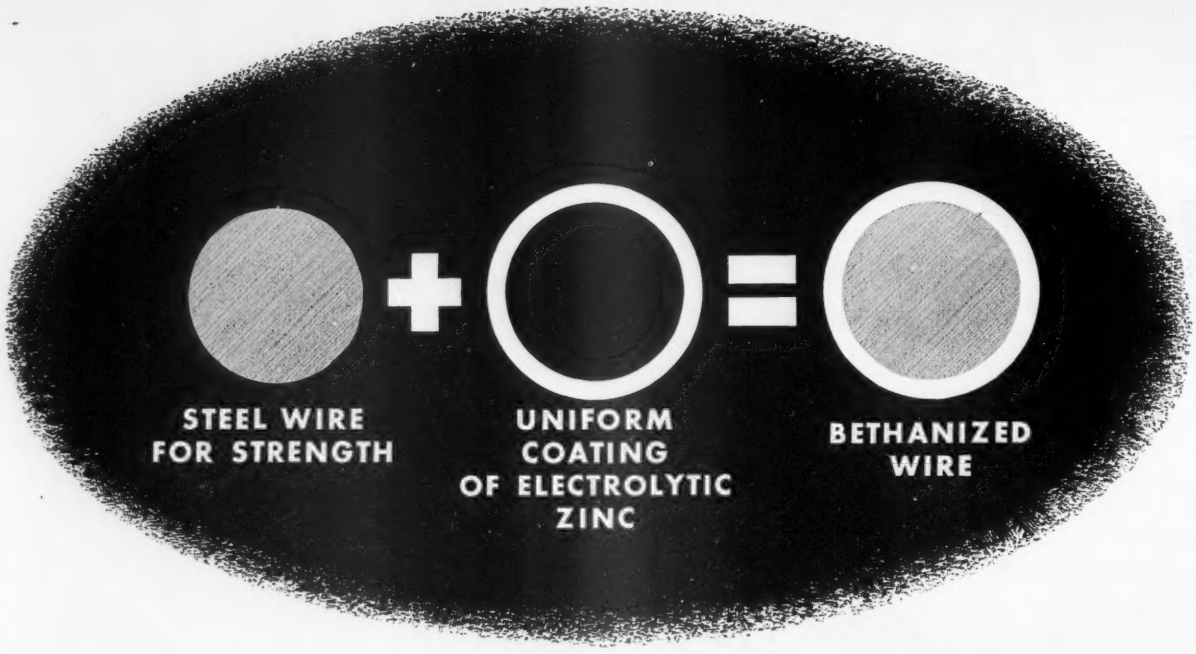
Fast deliveries

Order your wire dies from your nearest Carboloy Sales and Service Office, in Detroit, Los Angeles, Chicago, Pittsburgh, or Newark. Stocks, conveniently located, mean faster deliveries for you.

Send for free Carboloy Die Service Manual, D-119

CARBOLOY COMPANY, INC., 11171 E. 8 Mile Road, Detroit 32, Michigan

CARBOLOY®
CEMENTED CARBIDE



Bethanized Wire

solves Forming and Corrosion Problems

The coating uniformity of bethanized wire is made possible by the electrolytic deposition of zinc, atom by atom—both around and along the wire. Here's the kind of protection you can really depend on for corrosion-resistance.

Ductility is another important feature. The zinc coating withstands the most severe forming operations because the 99.9-pct-pure zinc provides maximum ductility. Coating bond is a big advantage, too. The zinc armor is so tightly locked to the steel wire that you can twist it, bend it, wrap it, or even draw it through dies to fine gauge without cracking or peeling the zinc.

Bethanized wire has been used extensively for more than 15 years. Our backlog of orders is ample evidence of the satisfactory results it is giving in hundreds of different uses. Let us work with you in developing better wire products made of bethanized wire.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

Export Distributor: Bethlehem Steel Export Corporation

WIRE & WIRE PRODUCTS, Vol. 24, No. 3, March, 1949. Publication Office, at One Sherman Ave., Jersey City 7, N. J. Executive Office, 300 Main Street, Stamford, Conn. Published monthly by the Quinn-Brown Publishing Corp., Richard E. Brown, President; R. S. Spengel, Secy. and Treas. Subscription price: U. S. $5.00; Canada, $5.00 per year; 50 cents per copy; Foreign, $7.50 per year. Entered as second class matter, January 10, 1949, at the Post Office, Jersey City, N. J., under Act of March 3, 1879.

here's the NEW PROTECTIVE COATING for live wires

MARVINOL VR-10, the versatile vinyl resin, offers superior stability in protective coatings from raincoats to jackets and coatings for wire. Here are some of the advantages it offers you . . .

MORE STABILITY . . . In processing and in end products, Marvinol offers you greater stability . . . superior resistance to heat, light, oils, acids, aging, wear and other normally destructive forces . . . better low temperature characteristics. High molecular weight gives Marvinol coats and jackets extra toughness and "dryness."

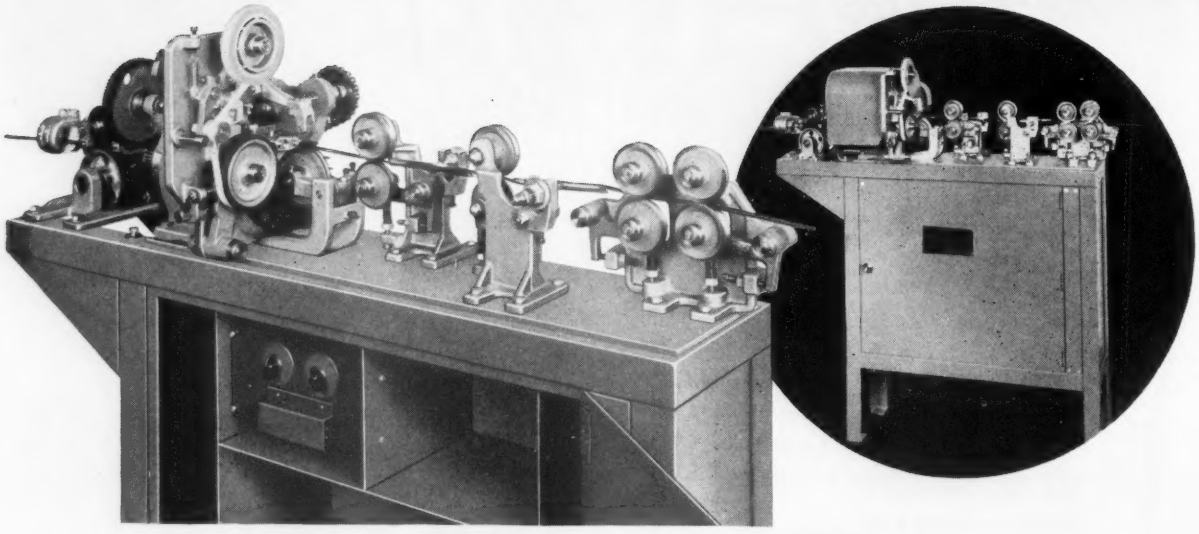
MORE PROCESSING ADVANTAGES . . . Production runs prove that Marvinol gives shorter premix and Banbury cycles plus faster extrusion rates. These are important savings whether you are calendering, extruding or molding. Wire coatings made from Marvinol may be brilliantly or delicately colored . . . are easily cleaned.

MORE UNIFORMITY . . . Marvinol resins are a development of Martin research and Martin's quarter-century of plastics experience. Produced in the world's most modern chemical plant, they assure unexcelled uniformity. The Glenn L. Martin Company does not compound or fabricate in the plastics field. If you make or coat wire, our sales engineers and customer service laboratory offer full technical cooperation. If you buy or use finished wire, write to Chemicals Division, Dept. W-3, The Glenn L. Martin Company, Baltimore 3, Maryland.

Martin ® Marvinol

RESINS, PLASTICIZERS AND STABILIZERS PRODUCED BY THE CHEMICALS DIVISION OF
THE GLENN L. MARTIN COMPANY • AN INTERNATIONAL INSTITUTION
"BETTER PRODUCTS, GREATER PROGRESS, ARE MADE BY MARTIN."

Type AC
WIRE LABELLING MACHINE
For Labelling Power Supply Cords and Cord Sets



Only 15 Minutes a Day

Regulating By An Operator To —

- **Apply ONE PRESSURE SENSITIVE Underwriters' Approval Label**
- **On EACH Cord Set or Power Supply Cord**
- **REGARDLESS of The Length of The Cord Set or Power Supply Cord**
- **At ANY DESIRED Position on The Cord (Label Position May Be Changed By Simple Manipulation of The Dial While Machine Operates at Full Speed!)**
- **During The SAME Operation As Cutting and Stripping On Your Present Artos Type CS-5 Cutting and Stripping Machine**
- **At a LOW Initial and LOW Upkeep Cost**
- **With a PROVED Method of Label Application.**

GET THE COMPLETE PRESSURE SENSITIVE LABEL PROPOSITION COVERING CORD SETS and POWER SUPPLY CORDS!

Take Full Advantage of PRESSURE SENSITIVE Label Advertising Directed to Your Customers in ELECTRICAL MANUFACTURING, ELECTRICAL MERCHANDISING and ELECTRONICS!

Ask for Reprints of PRESSURE SENSITIVE Label Advertising!

JAMES L. ENTWISTLE CO.
43 CHURCH STREET, PAWTUCKET, RHODE ISLAND

30 YEARS OF SERVICE TO THE WIRE INDUSTRY

Canadian Representatives:
THE A. R. WILLIAMS MACH. CO., LTD.
64 FRONT ST. W.
TORONTO, ONT.

British Associates:
GENERAL ENGINEERING CO., LTD.,
BURY ROAD, RADCLIFFE,
LANCS., ENGLAND

...10 TIMES EACH WAY!

Chase wire for cold-heading passes this *GRUELING TEST* every day!

As one of the means of assuring you the very best quality wire, each Chase copper-alloy wire coil is subjected to this severe twist and reverse twist test.

No seams, slivers or other surface physical defects can hide from *this* searching test. And it's just one of many! Chase wire for cold-headed products is also subjected to a compressing or upsetting test that simulates a very severe heading operation.

In addition, Chase wire must be uniform in surface texture and color, have accurate dimensions, be precisely tempered. And there's a Chase copper-alloy wire for *every need!* Write the nearest Chase Warehouse or Service Office, and be *sure* of the best.

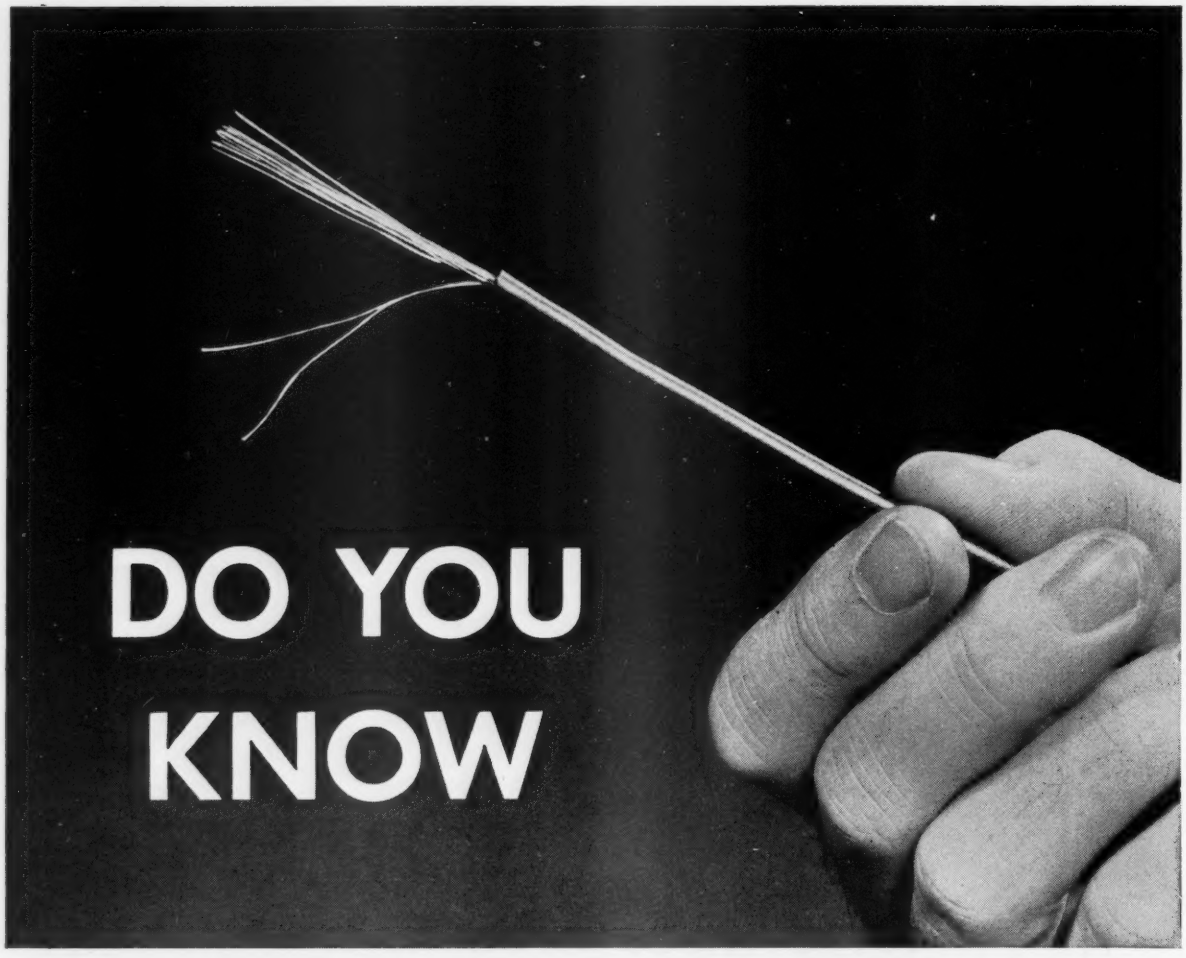
Chase

the Nation's Headquarters for
BRASS & COPPER

WATERBURY 91, CONNECTICUT — SUBSIDIARY OF KENNECOTT COPPER CORPORATION

THIS IS THE CHASE NETWORK . . . *handiest way to buy brass*

ALBANY† ATLANTA BALTIMORE BOSTON CHICAGO CINCINNATI CLEVELAND DETROIT HOUSTON† INDIANAPOLIS KANSAS CITY, MO. LOS ANGELES MILWAUKEE MINNEAPOLIS NEWARK NEW ORLEANS NEW YORK PHILADELPHIA PITTSBURGH PROVIDENCE ROCHESTER† SAN FRANCISCO SEATTLE ST. LOUIS WATERBURY (†Indicates Sales Office Only)



...WHY DYED FIBERGLAS* 450's YARNS ARE USED AS COMPANY MARKERS IN WIRE AND CABLE?

- **High Tensile Strength (Good Application Efficiency)**
- **Small Size (Minimum Space Occupancy)**
- **Large Supply Packages (Minimum Package Changes)**
- **Will Not Absorb Moisture**
- **High Temperature Resistance**
- **Low Cost Per Unit Length of Yarn**

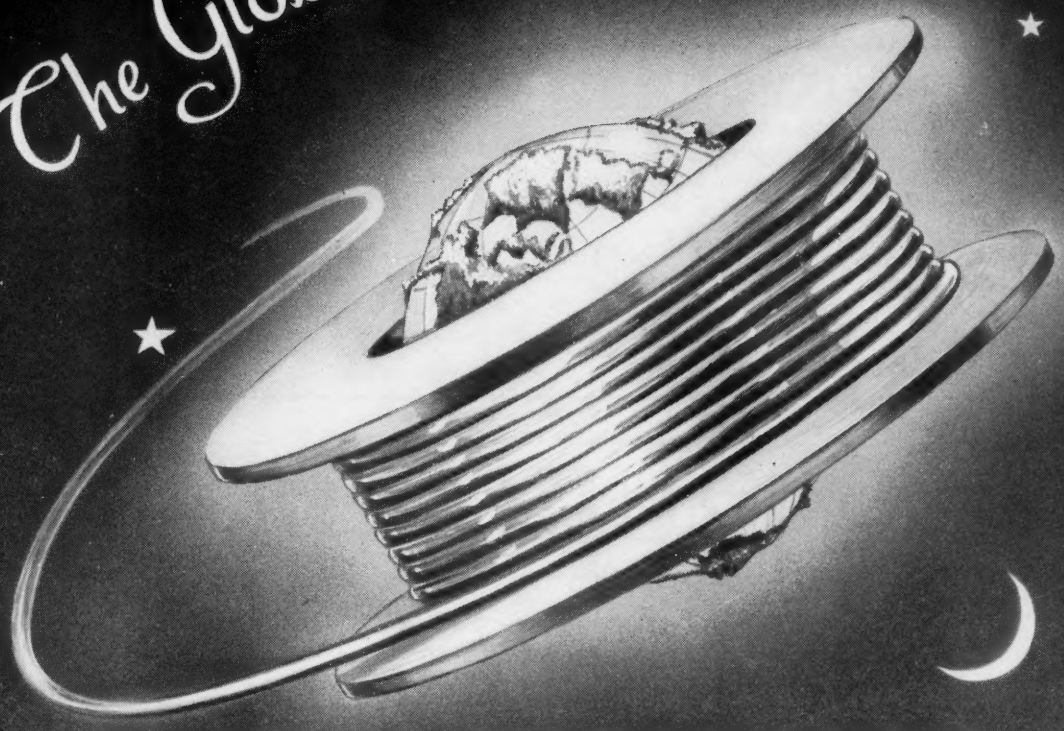
For complete information about Fiberglas Yarns for this, and other electrical uses, write Owens-Corning Fiberglas Corporation, Dept. 875, Toledo 1, Ohio. Branches in principal cities.

In Canada: Fiberglas Canada Ltd., Toronto, Ontario

OWENS-CORNING
FIBERGLAS
TM. REG. U.S. PAT. OFF.
Yarns

***FIBERGLAS is the trade-mark (Reg. U.S. Pat. Off.) for a variety of products made of or with glass fibers by Owens-Corning Fiberglas Corporation.**

The Globe could be Girded...



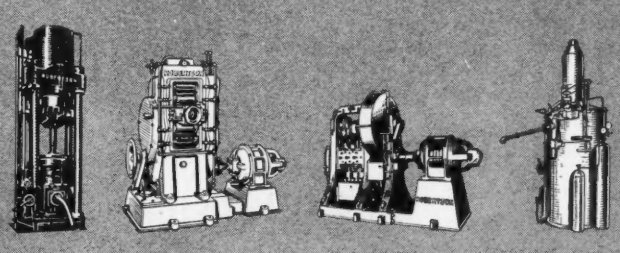
Yes, the world could be encircled many times with lead encased cables produced on Robertson Equipment—by such leading manufacturers as:

Western Electric, General Electric, Rome Cable, Crescent Insulated Wire & Cable Company, National Lead Company, National Electric, Simplex Wire & Cable Company, Paranite Wire & Cable, Roebling.

These firms—suppliers of a substantial portion of the world's communications and power and light cables—rely on Robertson Equipment, which incidentally, is the result of more than 90 years' specialization in high pressure hydraulics. "Robertson is proud of the company it keeps."

Robertson Equipment includes: Lead Encasing Presses; High Pressure Hydraulic Pumps; Lead Sheath Stripping Machines; and Lead Melting Pots for the Hose and Cable Industries.
Write for detailed information.

JOHN Robertson
COMPANY INCORPORATED
125 WATER STREET, BROOKLYN 1, NEW YORK
Designers and Builders of all Types of Lead Encasing Machinery
Since 1858



HUDSON WIRE COMPANY

PRODUCERS OF FINE WIRES IN ALL METALS

FINE BARE WIRES

High Brass, Low Brass, Zinc 99.99+ and High Tensile Zinc, Commercial Bronze, Phosphor Bronze, Pure Tin, Lead, Antimonial Lead, Tinsel Lahns, Silver Plated Copper, False Gold and Copper.

Cadmium, Nickel Silver (10%, 18%, 30%), Silver Plated Copper, False Gold and Special Brass and Bronze Alloys to Specification, Metallic Fibre for Packing Purposes, Copper, Bronze, Zinc, Lead and Aluminum.

WIRES FOR METAL SPRAYING

Pure Lead, Lead Alloys, Pure Zinc, Zinc Alloy, Copper, Tin, High Brass, Low Brass, Solder Wire, High Conductivity Electric Wire.

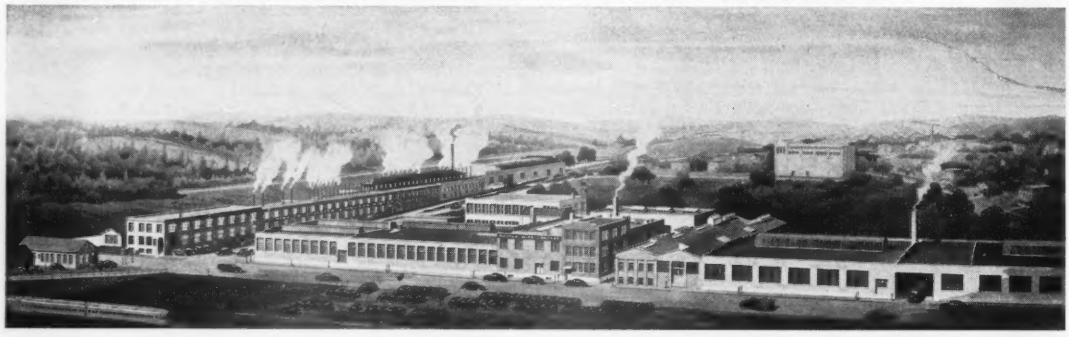
Cadmium, Nickel Silver (10%, 18%, 30%), Aluminum, Monel Metal, Phosphor Bronze, Pure Nickel, Commercial Bronze.

Look for the name — **HUDCO** — A guarantee of quality

"HUDCO" specially processed Copper Wire for enamelling purposes is drawn from Selected Copper, insuring the maximum conductivity. This is but one example of the use of the most advanced and approved materials and methods in our processing.

BETTER WIRE AT LOWER COST

Write for Prices and Samples • Let Us Quote on Your Requirements

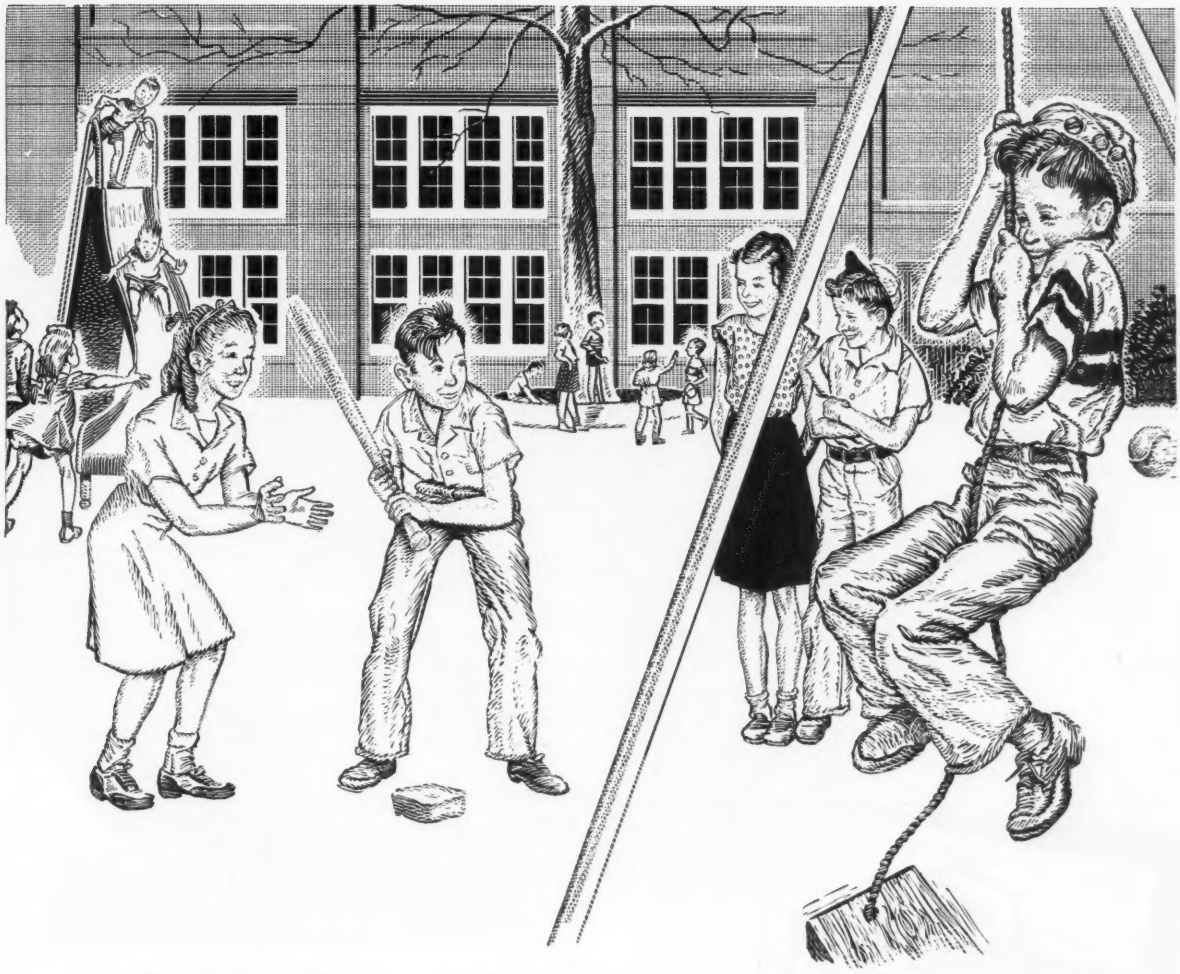


"HUDCO" PLANT AT OSSINING, NEW YORK

HUDSON WIRE COMPANY

Established in 1902 — Successors to Royle & Akin

OSSINING, NEW YORK



Freedom begins at home

IN America we take Freedom for granted. It is hard for us to understand why anybody would willingly give up his freedom, to live under a rule that dictates every move of his life.

Yet we must face the sobering fact that right here at home there are plenty of people who are working to curtail, and eventually to abolish personal freedom, and substitute rigid central controls over our activities. Too often these misguided groups and individuals work harder at their self-appointed tasks than do we who think we prefer freedom.

We as business men, above all others, perhaps, have a responsibility in this matter which we can ignore only at the peril of our own survival.

The Youngstown Sheet and Tube Company

General Offices -- Youngstown 1, Ohio
Export Offices--500 Fifth Avenue, New York

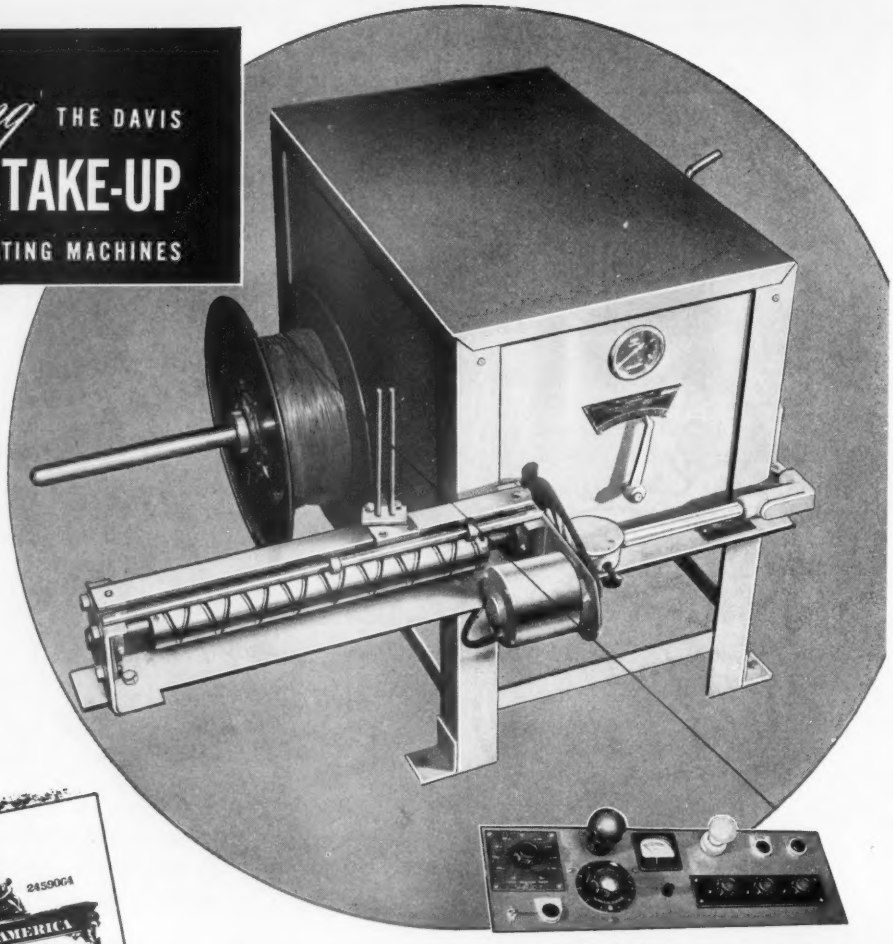
MANUFACTURERS OF CARBON, ALLOY AND YOLOY STEELS

ELECTROLYTIC TIN PLATE - COKE TIN PLATE - WIRE - COLD FINISHED CARBON AND ALLOY BARS - PIPE AND TUBULAR PRODUCTS - CONDUIT - RODS - SHEETS - PLATES - BARS - RAILROAD TRACK SPIKES.

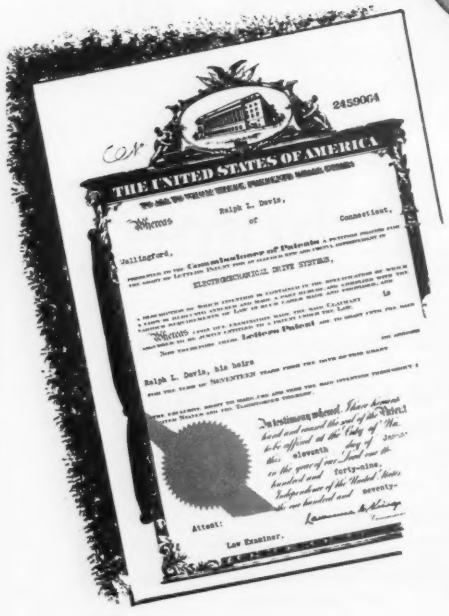
Introducing THE DAVIS

EXTRUDER TAKE-UP

FOR PLASTIC INSULATING MACHINES



Combination Control & Sparker Panel



2459064

THE UNITED STATES OF AMERICA

Ralph L. Davis,

of Connecticut.

ELECTROMECHANICAL DRIVE SYSTEM,

Ralph L. Davis, his heirs

EXCERPTS FROM U. S. PATENT 2459064

- A simplified, inexpensive electromechanical drive system for the reeling of wire at constant and predetermined speeds to suit the size of wire while in operation. . .
- Provides positive motor drive for a take-up reel which permits continuous reeling of wire at a fixed tension and with a minimum of auxiliary electrical equipment. . .
- The apparatus utilizes a polyphase induction motor which is energized from a polyphase power source through impedance elements in each phase — and reels wire at constant tension over extremely wide ranges in reeling diameter.

The Davis Extruder Take-Up is now in successful operation in some of America's most famous research laboratories. Names upon request.

Write Davis today for detailed information!

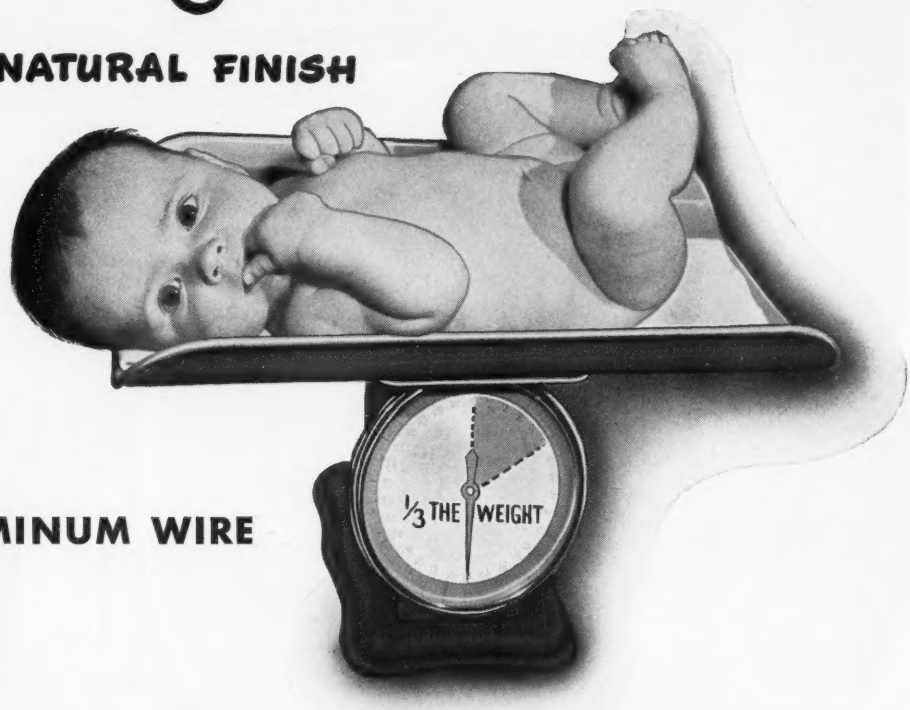
DAVIS EQUIPMENT

THE R. L. DAVIS ELECTRIC CO., INC. • WALLINGFORD, CONN.

SPARK TESTERS • SPOOLERS • TAKE-UPS • CAPSTANS

light-weight...

WITH NATURAL FINISH



ALCOA ALUMINUM WIRE

One-third the weight of steel or brass . . . endowed with a lustrous, *natural* finish . . . Alcoa Aluminum Wire is a prize "baby" for many sales-minded fabricators. Versatile aluminum wire products take any finish other metal products will take, *plus*, the patented Alumilite finish in any eye-catching color you choose.

You'll like the way Alcoa Aluminum Wire works on your machines. Its high tensile strength . . . economy (3 times as many feet of wire in a pound of aluminum as in a pound of the heavier metals). Our aluminum wire is made in a variety of alloys and tempers, in shapes and sizes to meet your requirements. ALUMINUM COMPANY OF AMERICA, 1828 Gulf Building, Pittsburgh 19, Pennsylvania.

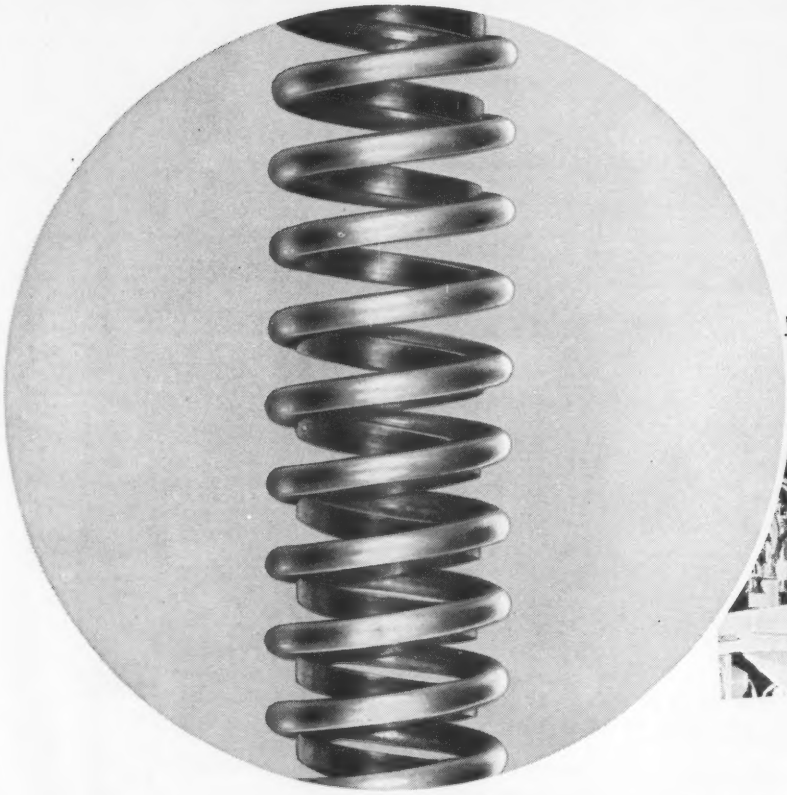
Send for copies of "Alcoa Aluminum and Its Alloys", complete information and data on all Alcoa Aluminum Alloys, plus 64-page, four-color booklet, "Finishes for Alcoa Aluminum".

ALCOA FIRST IN **ALUMINUM**

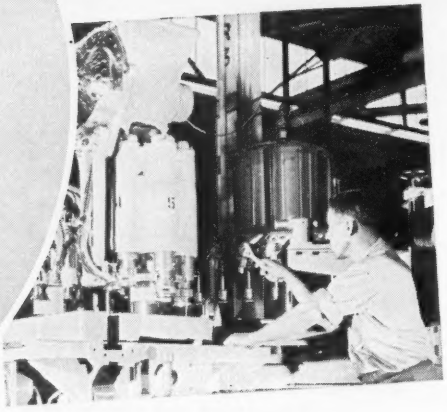
ALCOA ALUMINUM

THIS SPRING

always remembers to say "when"



Final assembly of carbonated beverage machine equipped with bottle-lift cylinder springs of ARMCO 16-2 Stainless Steel Spring Temper Wire. Spring is made of 3/16" diameter wire, heat treated and cold drawn.



In bottling plants, Stainless Steel springs like this have a never-ending job of raising soft-drink bottles to the filling level. Because they are now made of ARMCO 16-2 Spring Temper Wire they last many times longer than plated springs formerly used.

Old-type springs often failed after a short time because the carbonated water caused severe corrosion after an inner bearing-spring wore away the plated surface. The result was a complete shutdown of the bottler.

Besides its corrosion-resisting properties, another important advantage of ARMCO 16-2 Spring Wire is its low permanent set at elevated temperatures. Tests show permanent set is only 6.4% after 1400 hours at temperatures of 650° F. under stress of 40,000 psi.

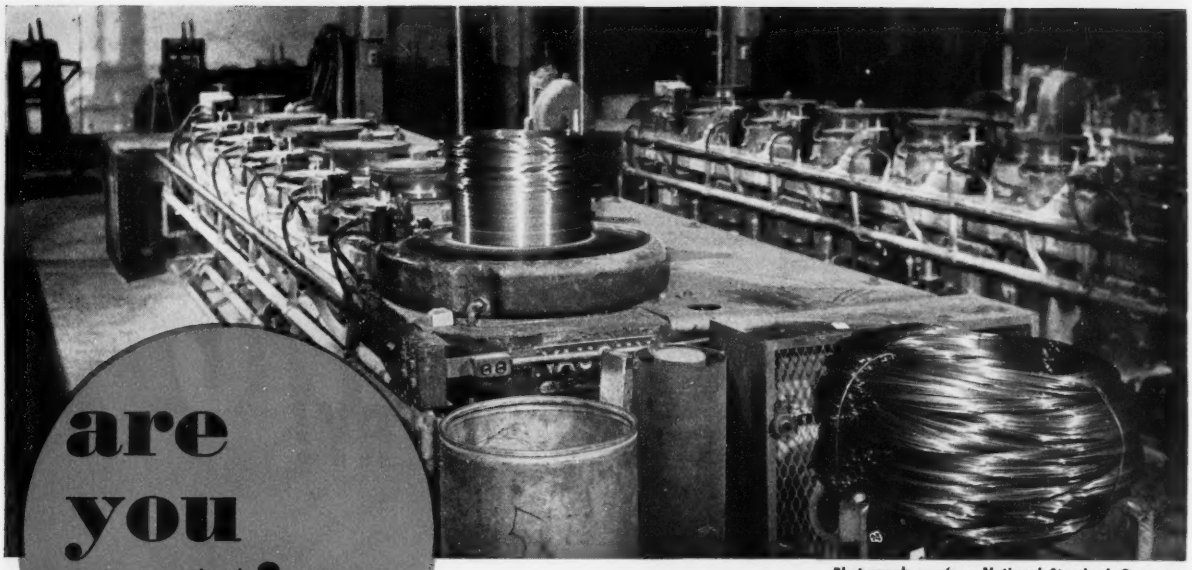
ARMCO "16-2" is high in tensile strength, torsional strength, fatigue resistance, and in elastic properties. It is exceptionally low in deflection, permanent set, and in elastic drift.

ARMCO 16-2 Spring Temper Wire is supplied in coils or straight lengths, with a standard cold-drawn finish or with a lead coat for automatic coiling machines.

Write for your copy of the descriptive folder "This New Spring Wire Gives Your Products 8 Big Advantages." Just address Armco Steel Corporation, 131 Curtis Street, Middletown, Ohio. Export: The Armco International Corporation.

Rustless Division of ARMCO

ARMCO STAINLESS STEEL WIRE



Photograph courtesy National-Standard Company

are you getting

... TENACIOUS FILMS
EFFECTIVE SLIP
CONSISTENT FOLLOW THROUGH
LONG DIE LIFE IN YOUR DRY DRAWING OPERATIONS?

You get all four from
Magnus Dri-Draw Compounds

... Insuring high speed production at minimum cost no matter how hard the draw.

Dri-Draw #4 provides an unusually tenacious, exceptionally strong film, which not only helps obtain a bright finish, but leads to much longer die life. This compound has been particularly useful in difficult draws on low carbon steel and on high carbon and stainless wires.

Dri-Draw #6 is an all-round dry drawing compound used for dry drawing of every description where the special properties of Dri-Draw #4 are not required.

●

Incidentally, have you investigated Magnus Metal Coat #267? This eliminates liming and produces better work at a much lower cost per ton of drawn product.

IN WIRE DRAWING IT'S

MAGNUS

CLEANERS • EQUIPMENT • METHODS

MAGNUS CHEMICAL COMPANY • 188 South Avenue, Garwood, N. J.

IN CANADA — MAGNUS CHEMICALS, LTD., 4040 RUE MASSON, MONTREAL 36, QUE.

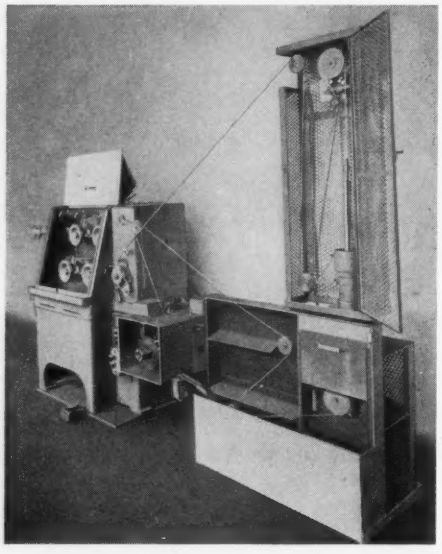
SYNCRO'S FAMOUS FIRSTS

MAGNETIC SLIP CLUTCHES	EXPANDING ARBORS	FREE WHEELING CAPSTANS	FINE WIRE SPOOLING	CONTROL TAPE TENSION APPLICATIONS	REPLACEABLE DRAWING BLOCK BANDS

SYNCRO SCORES AGAIN FOR THE WIRE INDUSTRY!

Added to the long list of SYNCRO's "famous firsts" in Machinery for the wire industry is the—

SYNCRO-COOK CONTINUOUS ANNEALER



- **Does annealing easier, faster, better**
- **Produces bright annealed wire at *maximum speed of drawing operation.***
- **Eliminates production of tarnished sticky, non-uniform annealed wire.**
- **Eliminates slow, uncertain annealing in enclosed furnaces.**

Is installed directly in conjunction with wire drawing machine for continuous annealing at drawing speed. Annealing of non-ferrous wire is done by resistance heating in the wire's non-stop passage between drawer and reeler or take-up.

Comes in range of sizes for drawing and annealing of wire from rod break down to fine wire machines.

Your inquiry is invited.

Standardize on Syncro Machines For The Wire Industry Standard or Special

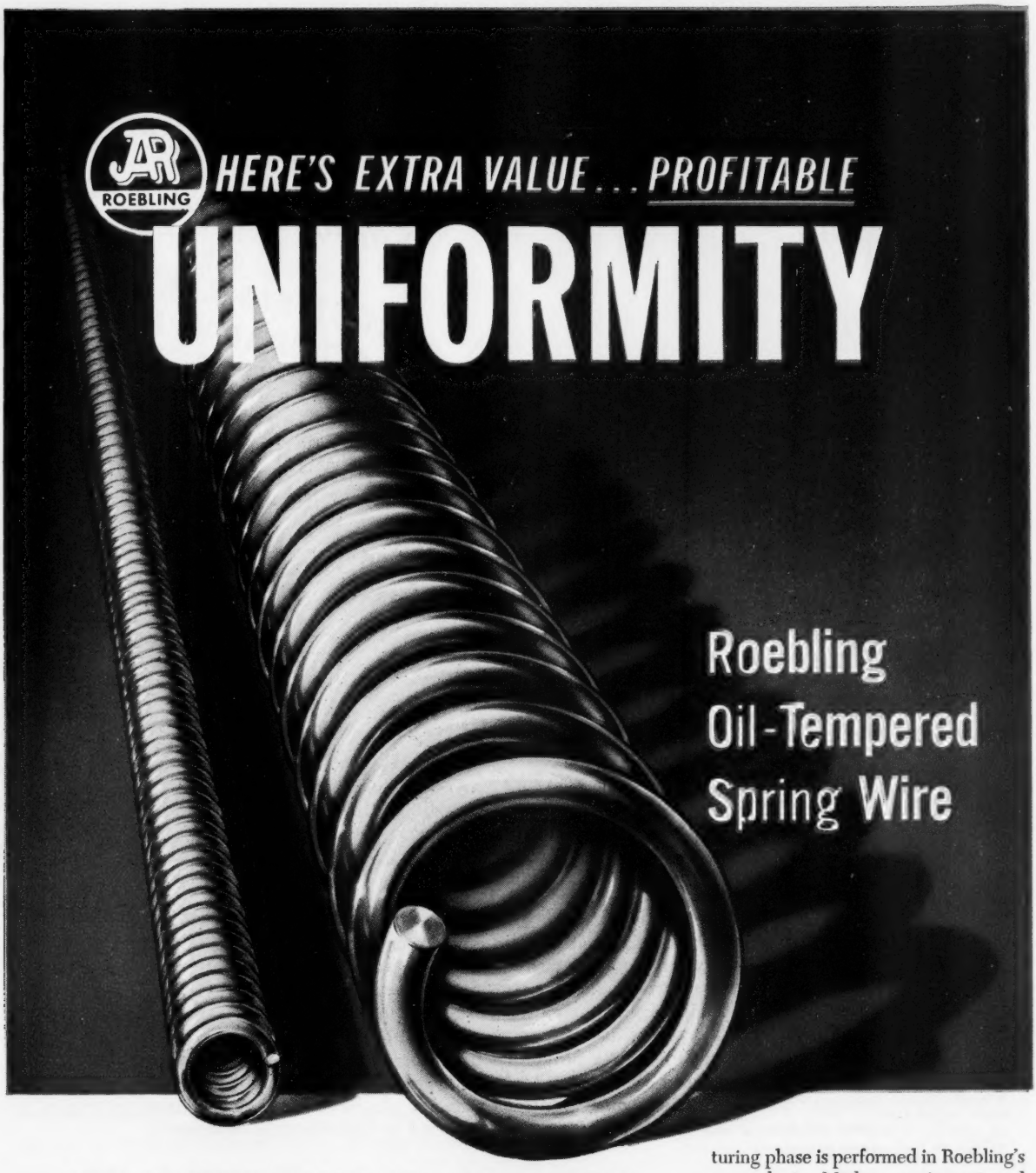
SYNCRO

SYNCRO MACHINE COMPANY

611 Sayre Avenue **Perth Amboy, N. J.**

Affiliated Company

Winget-Syncro, Rochester, Kent, England



CUTS MACHINE STOPPAGES AND REJECTS

PRODUCTION GOES INTO HIGH with Roebling Oil-Tempered Spring Wire. Every inch is just like every other inch . . . same gauge and grain structure . . . same strength, hardness and finish. And more than that, the dependably uniform analysis of Roebling Spring Wire enables you to maintain your specified quality standards without variation.

Roebling Oil-Tempered Spring Wire, in the higher carbons, is available in all standard sizes. From making the steel to the finished product, every manufacturing phase is performed in Roebling's own plants. Modern equipment and techniques assure wire of topmost quality . . . and it's available now!

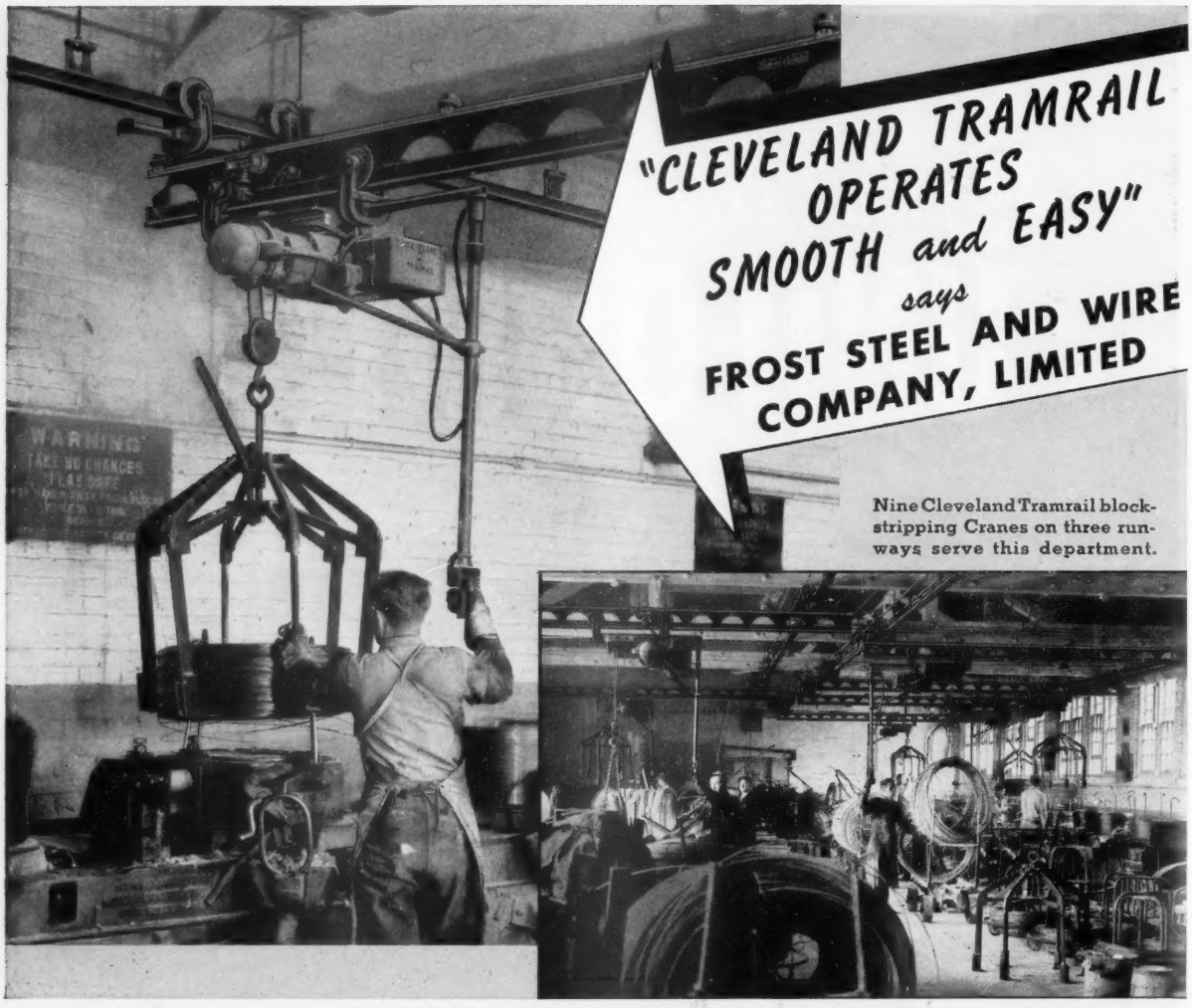
Your Roebling Field Man will be glad to help you select the right wire—round, flat or shaped—for top performance and economy in your own products. John A. Roebling's Sons Company, Trenton 2, New Jersey.

WRITE OR CALL THE ROEBLING FIELD MAN AT YOUR NEAREST ROEBLING OFFICE AND WAREHOUSE

Atlanta, 934 Avon Ave. ★ *Boston,* 51 Sleeper St. ★ *Chicago,* 5525 W. Roosevelt Rd. ★ *Cleveland,* 701 St. Clair Ave., N. E. ★ *Denver,* 1635 17th St. ★ *Houston,* 6216 Navigation Blvd. ★ *Los Angeles,* 216 S. Alameda St. ★ *New York,* 19 Rector St. ★ *Philadelphia,* 12 S. 12th St. ★ *Pittsburgh,* 855 W. North Ave. ★ *Portland, Ore.,* 1032 N. W. 14th Ave. ★ *San Francisco,* 1740 17th St. ★ *Seattle,* 900 First Ave.

ROEBLING

☆ *A CENTURY OF CONFIDENCE* ☆



"CLEVELAND TRAMRAIL OPERATES SMOOTH and EASY" says FROST STEEL AND WIRE COMPANY, LIMITED

Nine Cleveland Tramrail block-stripping Cranes on three runways serve this department.

External Block Stripping and Wire Handling Speeded

Like so many other companies, Frost Steel and Wire Company, Limited, Hamilton, Ontario, are proud of the Cleveland Tramrail installation in their wire-drawing room. It was only after considerable experience with other overhead handling equipment in their own plant and thorough study of various equipment in other plants, that Cleveland Tramrail was chosen.

Cleveland Tramrail has fully proven itself to Frost Steel and Wire. They find it operates smooth and easy. Wire handling is safer and production speeded because heavier bundles can be stripped from the blocks in faster time. Since their original installation in 1925 they have added to their tramrail equipment many times.

GET THIS BOOK!
BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
9213 EAST 288th STREET WICKLIFFE, OHIO

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

●STANDARD LUBRICANTS take a big slice out of our operating costs!

●STANDAND LUBRICANTS give us better wire finish every time!

●STANDARD LUBRICANTS do more than their share to speed up production!

●STANDARD LUBRICANTS are always dependable, always give us top performance!

●STANDARD LUBRICANTS and service engineers are a sure cure for wire drawing "headaches"!

●STANDARD LUBRICANTS insure maximum die life!

No matter how they part their hair, or where, leading wire producers depend on Standard Lubricants for faster, better wire drawing! Mill-tested for top performance, these special-purpose compounds are developed by experienced technicians to save you time, trouble, money!

If you're looking for high speed production, low operating costs and better wire finish, we think you'll find what you're looking for in the formulas perfected by Standard!

There's a Standard service engineer ready to work with you on any lubrication problem you may have. He's a mighty good man to know when the going gets rough. Next time you need help — or better wire drawing compounds — just call for Standard!

Standard's wire drawing compounds will produce the finish you require on all grades of steel, copper, or brass: — lime bright, extra bright, dull-coated; or special finishes for welding, lacquering, enamelling or plating.

STANDARD SERVICE CENTERS

INDUSTRIAL COMPOUNDS CO.
C. R. Mehl, President
2037 Sacramento Blvd.
Los Angeles 21, California

INDUSTRIAL COMPOUNDS CO.
C. R. Mehl, President
2425 Seventeenth Street
San Francisco, California

STANDARD INDUSTRIAL COMPOUNDS COMPANY
R. M. Conway
Millbury, Massachusetts

S

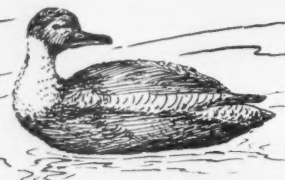
WIRE DRAWING LUBRICANTS

Standard

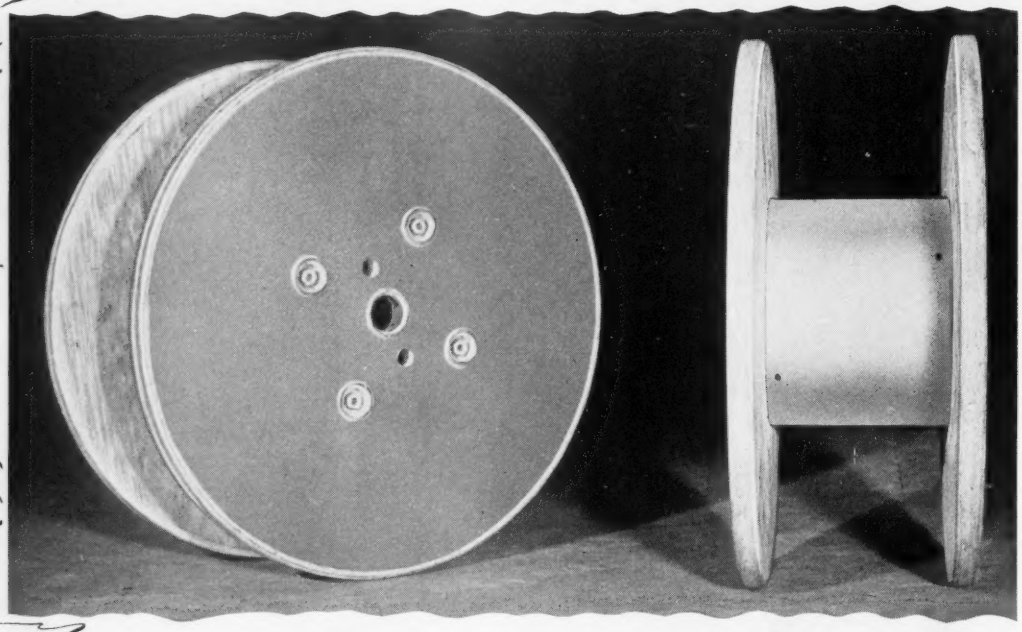
INDUSTRIAL COMPOUNDS CO.

4600 WEST FERDINAND STREET
• CHICAGO 44, ILLINOIS •

Takes To Water Like . . . .



this Hubbard Reel



Building special reels and spools for unusual applications is an important part of Hubbard's service to the wire and wire products industries.

The reels shown here are a good example. The copper cable industry had to have a reel for testing cable under water. Prolonged submersion of the entire reel was one of the conditions to be met. Obviously it had to be water repellent. Hubbard solved the problem with a barrel of galvanized steel . . . a flange of 7-ply 1 inch processed hardwood, bonded with waterproof glue.

If your company has a wire manufacturing problem that calls for a special type spool or reel, contact Hubbard. For manufacturing operations, or for shipping or storing, Hubbard has thousands of types and sizes available at minimum cost.

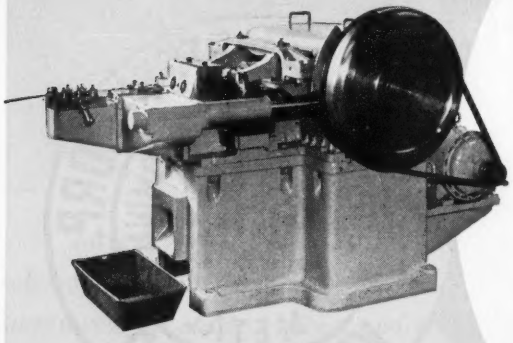
HUBBARD SPOOL COMPANY

1624 CARROLL AVENUE • CHICAGO 12, ILLINOIS

Hubbard

STEEL SPOOLS AND REELS . . . METAL BOUND
SPOOLS AND REELS . . . STEEL TRAVERSES
LIGHT WEIGHT REELS . . . WOOD REELS

From this Modern Plant -



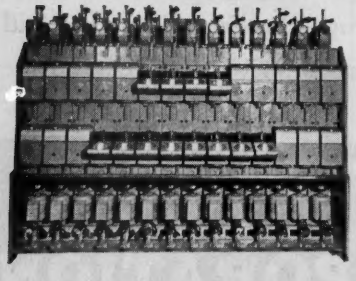
New Black nail machine speeds production and lowers costs.

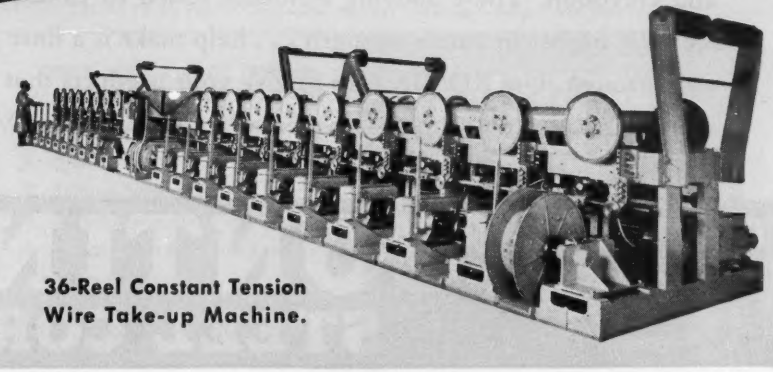
come the new special and standardized machines which are setting higher performance records and lowering costs in steel plants and wire mills.

Making recommendations after a study of your needs involves no obligation. Write today.

BLACK INDUSTRIES
1400 EAST 222nd ST. • CLEVELAND, OHIO

High Speed Machine for Double Insulating Magnet Wire.





36-Reel Constant Tension Wire Take-up Machine.

GOOD... *through* THE CORE

● Many products made of wire can be built for longer life and improved, trouble free service if they are made from KONIK metal. KONIK, containing copper, nickel and chromium, offers manufacturers a stronger, tougher wire with *extra* resistance to rust and corrosion. These alloying elements added to Continental open hearth steel make KONIK higher in tensile strength . . . help make it a finer grained, tougher metal *all the way through*. Use KONIK wire to give your products that rugged resistance to wear and corrosion . . . to make them serve better and last longer. Wire or write Continental.

CONTINENTAL STEEL CORPORATION

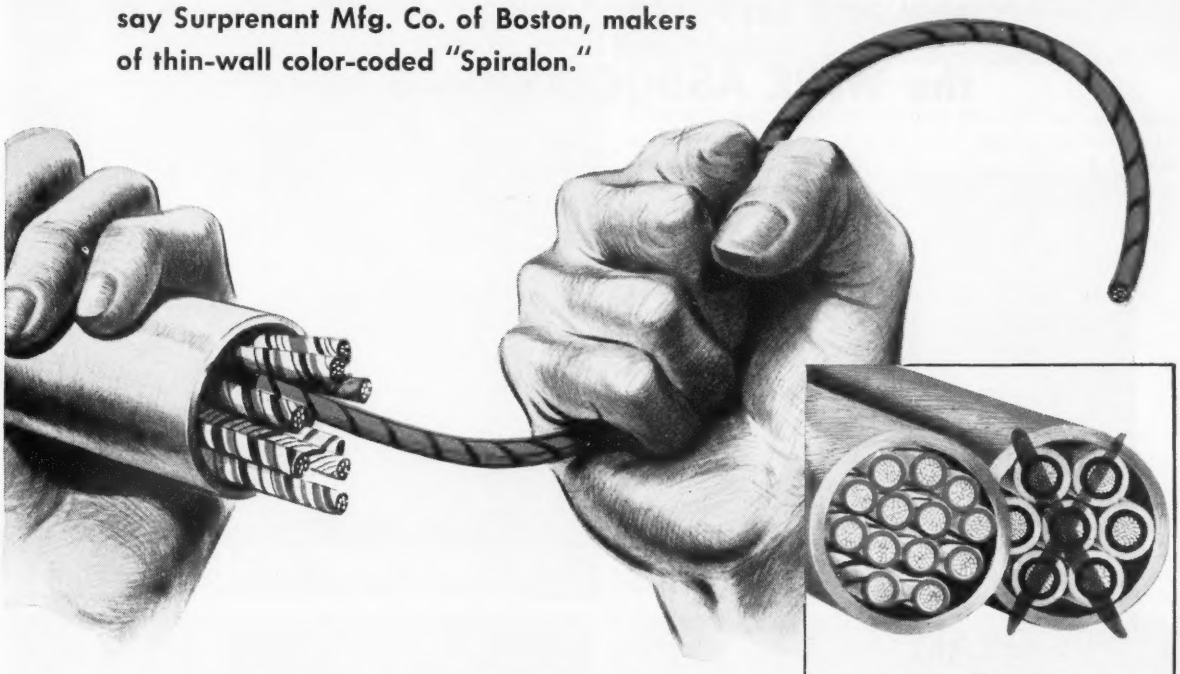
GENERAL OFFICES • KOKOMO, INDIANA

PRODUCERS OF *Manufacturer's Wire* in many sizes, shapes, tempers and finishes, including Galvanized, KOKOTE, Flame-Sealed, Coppered, Tinned, Annealed, Liquor Finished, Bright, Lead Coated, and special wire. ALSO, Coated and Uncoated Steel Sheets, Nails, Continental Chain Link Fence, and other products.

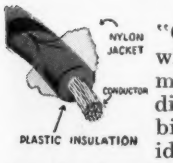
Why are big wire producers using Du Pont NYLON plastic?

"Unsurpassed as a protective jacket for wire,"

say Surprenant Mfg. Co. of Boston, makers of thin-wall color-coded "Spiralon."



"Jacketing of Du Pont NYLON helps us produce a color-coded wire with fungus- and abrasion-resistance, extra smoothness for easier pulling, and many other advantages."

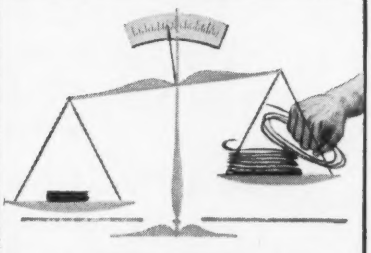


"Our new 'Spiralon' wire is available in many thousands of distinct color combinations, making identification easy even in the most complex installations," report Surprenant Manufacturing Company. "It consists of a conductor, color-coded plastic insulation, and a transparent protective jacket of Du Pont nylon. The nylon cover can be applied easily and rapidly. It's *extra smooth*. It's tough and long lasting. It resists heat, oils, many chemicals, abrasion, and flexing. And nylon helps us produce a wire with *smaller diameter* and *lighter weight*. We feel it is unsurpassed as a thin-wall extruded covering."

Know these facts—for profits

Wire, cable and many other electrical products today are *better* products, because of Du Pont nylon. This Du Pont plastic can be molded or extruded, and colored to fit specifications. For your own good—don't overlook its remarkable properties. Write for free booklet, "65 Success Stories of Product Improvement." Filled with helpful facts. Just address: E. I. du Pont de Nemours & Co. (Inc.), Plastics Dept., Room 153, Arlington, N. J.

Wire has **SMALLER DIAMETER,** permits more wires in limited area.



Wire is **LIGHT IN WEIGHT,** and resists heat, oils, water, chemicals, abrasion and flexing.

TUNE IN Du Pont's "Cavalcade of America"—Monday Evenings—NBC coast to coast.

CHECK THESE 7 BASIC FEATURES OF NYLON FOR ELECTRICAL USES

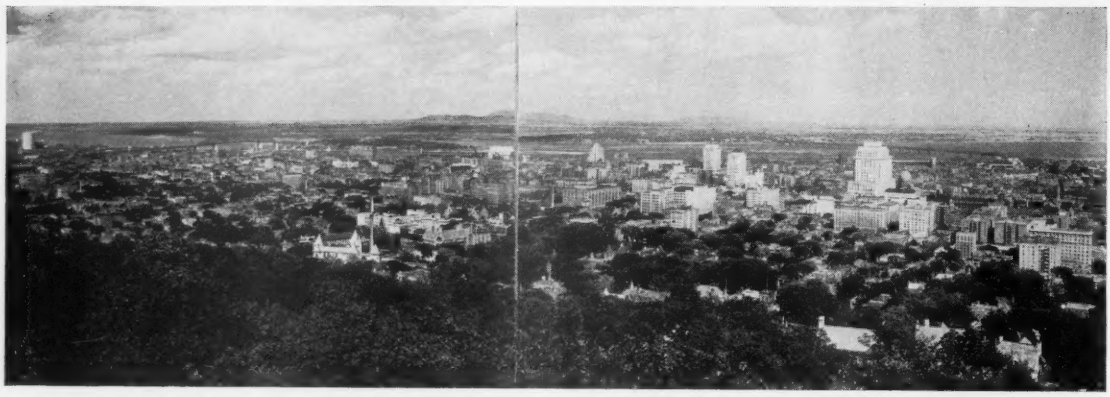
1. Good flexibility
2. High tensile strength
3. Extreme toughness
4. Abrasion resistance
5. Resistance to permanent set
6. Chemical resistance
7. Ability to be molded or extruded . . . colored or in natural color.

DU PONT
REG. U.S. PAT. OFF.
Plastics
BETTER THINGS FOR BETTER LIVING THROUGH CHEMISTRY

Plan Now to Attend the...

CANADIAN REGIONAL MEETING

— a new and important event in the annals of the WIRE ASSOCIATION'S history.



Dominion Square, Montreal

PROGRAM

April 28th: Registration, 9 to 10 A.M., Mount Royal Hotel, Montreal, Can.
Plant visit to Steel Company of Canada Mill in the morning.
Lunch provided at Northern Electric Company, Lachine.
Plant visit to Northern Electric Company's new Wire Mill in the afternoon.
Dinner and Entertainment (Ladies Invited) in the evening.

April 29th: Technical Sessions starting at 10 A.M.
Papers will cover wet and dry lubricants, controls and material handling.

Reservation cards are being mailed to members in the U.S.A. If you, by any chance, have not received one, please write for it. This will be a big event; please come!

REGISTRATION FEE: $5.00; DINNER TICKETS: $5.00

ALLEN B. DOVE, Chairman
P.O. Box 460, Montreal,
P.Q., Canada.

H. MILLER, Secretary
Northern Electric Co.
Montreal, Canada.

RICHARD E. BROWN, Executive Secretary

THE WIRE ASSOCIATION

300 MAIN STREET STAMFORD, CONN.

You Can Cut Spring Grinding Costs with NORTON Discs!

BECAUSE when you specify NORTON Discs, you have a **choice** of abrasive, a **choice** of bond, and a **choice** of grain, grade and structure. This **freedom of choice** enables you to obtain a disc of exactly the right combination—a disc with all the properties required to give you a fast, cool cut and extra long life on each of your spring grinding jobs.

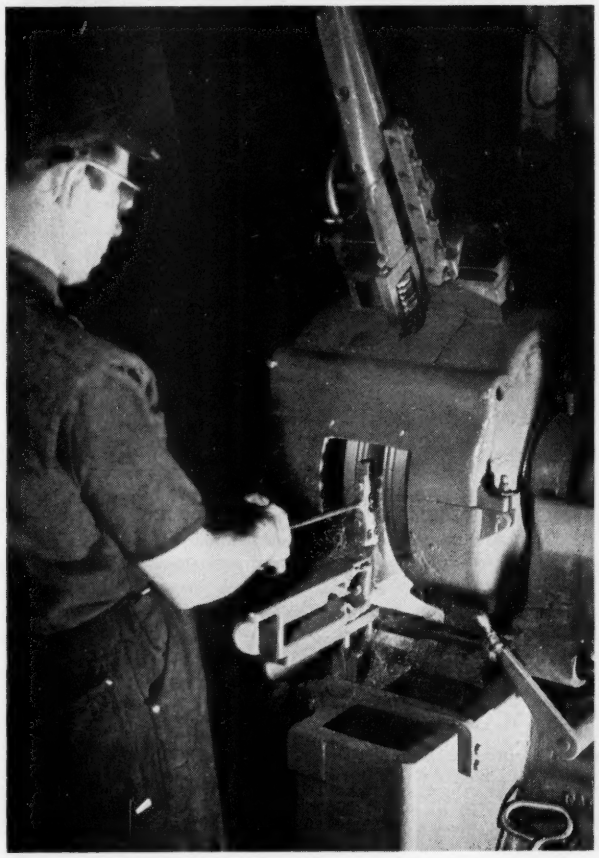
Let a NORTON abrasive engineer study your spring grinding jobs. He'll take into consideration the type of grinder you're using, the material you're grinding, the size and shape of the work, the amount of stock to be removed, and the finish desired. Then he'll recommend a NORTON Disc of the right combination.

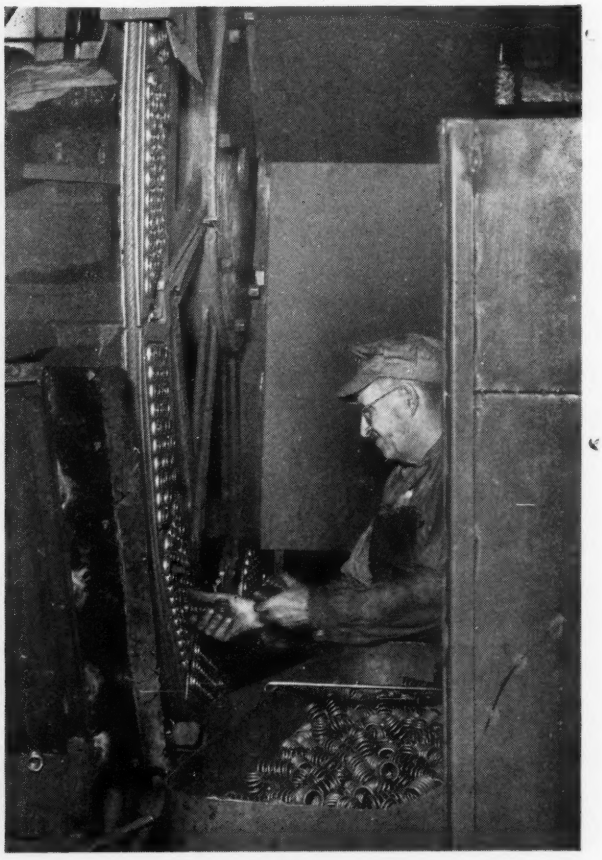
NORTON COMPANY WORCESTER 6, MASS.

Distributors In All Principal Cities

NORTON ABRASIVES

W-1210





Which of these Characteristics do you Require?

These are but a few of the many Wissco steel specialty wires produced by Wickwire Spencer, whose ability to meet exacting specifications has been a tradition for over 125 years.

We can meet your requirements for high or low carbon steel specialty wire; round or shaped; in a wide variety of sizes, tempers, grades and finishes. Send your order or inquiry to Wickwire Spencer.

IN THESE WISSCO WIRES *Strength and Flexibility* ARE ESSENTIAL

WISSCO HOSE REINFORCING WIRE, Wissco Shaft Wire and Wissco Crimped Brush Wire, while differing in chemical and physical composition, are all high in tensile strength and are manufactured for specific applications.

THESE WISSCO WIRES ARE DESIGNED FOR *Severe Forming Operations*

WISSCO BINDING WIRE and Wissco Preformed Staple Wire must be of close tolerance and uniformity as to tensile strength, hardness, size and finish.

HERE'S A WISSCO WIRE IN WHICH *Workability* IS AN IMPORTANT FACTOR

WISSCO SPHEROIDIZED WIRE is dead soft and easy on your wire working machines. After fabrication it is of a suitable type of material for hardening.

IN THESE WISSCO WIRES *Precision* IS OF VITAL IMPORTANCE

WISSCO DENT SPACER WIRE and Wissco Card Wire are held to tolerances as close as one ten-thousandth of an inch . . . must also be uniform in temper and finish and, in case of card wire, must be very straight and uniformly tempered.

WISSCO *Wire*

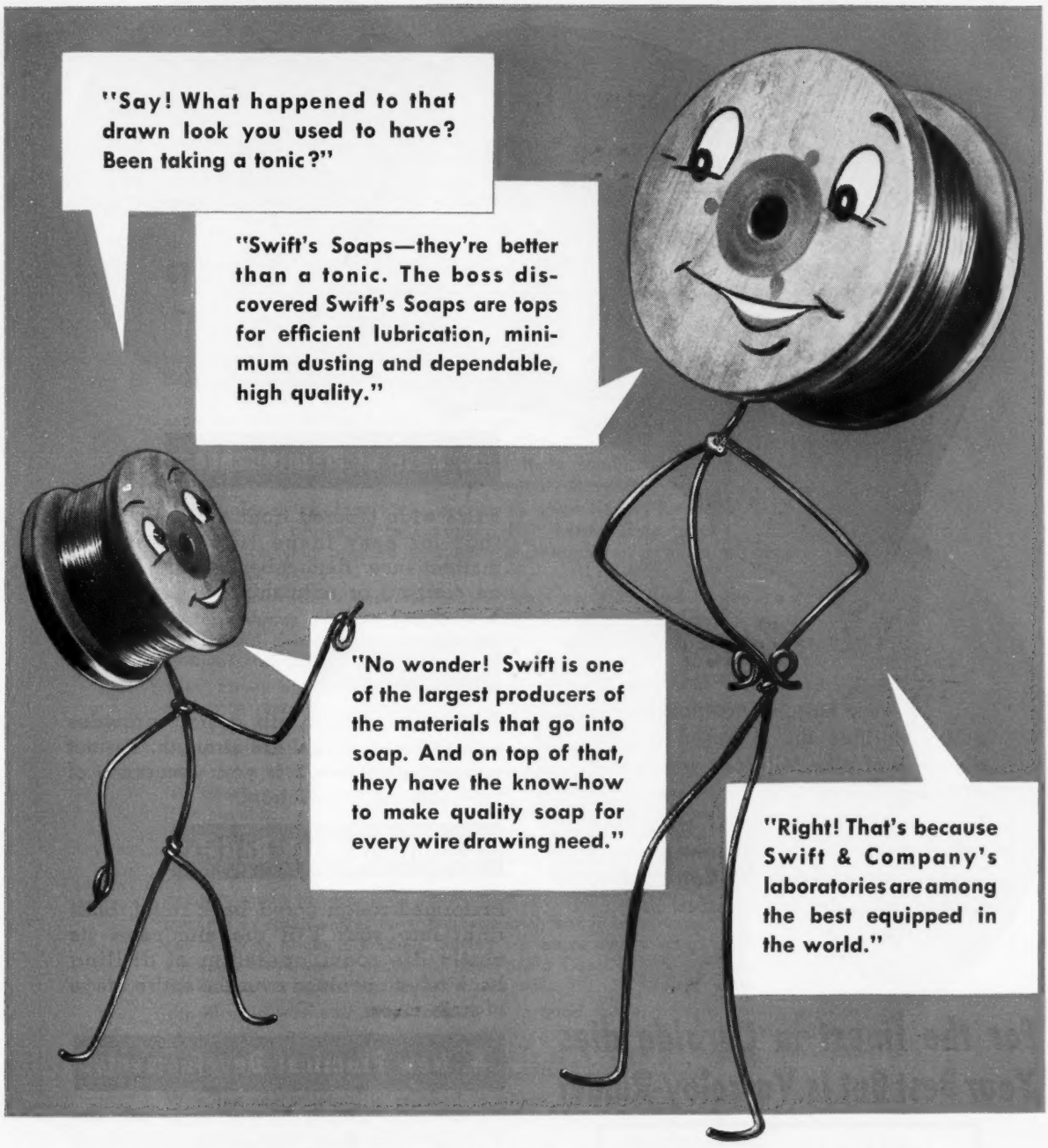
A PRODUCT OF WICKWIRE SPENCER STEEL DIVISION · THE COLORADO FUEL AND IRON CORPORATION

WIRE SALES OFFICE—361 DELAWARE AVE., BUFFALO 2, N. Y.

EXECUTIVE OFFICE—500 FIFTH AVE., NEW YORK 18, N.Y. · SALES OFFICES—BOSTON·CHICAGO·DENVER·NEW YORK

PACIFIC COAST SUBSIDIARY—THE CALIFORNIA WIRE CLOTH CORP., OAKLAND 6, CAL.

CF&I


"Say! What happened to that drawn look you used to have? Been taking a tonic?"
"Swift's Soaps—they're better than a tonic. The boss discovered Swift's Soaps are tops for efficient lubrication, minimum dusting and dependable, high quality."
"No wonder! Swift is one of the largest producers of the materials that go into soap. And on top of that, they have the know-how to make quality soap for every wire drawing need."
"Right! That's because Swift & Company's laboratories are among the best equipped in the world."

There's a Swift Distribution Point near you . . . to give you fast, efficient service. Call on Swift for

Swift's Soaps
for every wire drawing operation

Powdered White Ribbon
Guaranteed Powder
Snap Heavy Duty
Wire Drawing Powder No. 282
No. 559 Powdered Soap

In barrels and bags

Swift & Company

Soap Department, Chicago 9, Illinois

Developed in your Shop ?

Yes!

. . . . . every feature incorporated in a V-R Carbide die is based on the demands of Wire Mill Men who know drawing dies best!

Incorporating FOUR of the most advanced die developments, all pioneered by Vascoloy-Ramet; V-R Carbide dies are unsurpassed in:

1. Ease of Maintenance:

Extra wide tapered front and back openings for easy inspection and simple maintenance. Remember NO steel to cut on resizing or refinishing operations on V-R dies.

2. Strength:

Exclusive tapered nib design provides tremendous internal nib strength. Perfect concentricity of nib is your assurance of on-tolerance production.

3. Built-in Back Reliefs:

Preformed rough cored back relief, built right into your V-R die eliminates its costly die room operation of drilling back relief openings over the entire range of hole sizes.

4. New Practical Developments:

Of special interest to die users are the V-R Carbide dies now being furnished, rough cored to finish, at hole sizes below .015". These rough cored dies are available in dies sizes R-0, R-1, R-2, and R-3, rough cored at .004" and .010".

For the finest in Carbide dies
"Your Best Bet is Vascoloy-Ramet"

PHONE
Your Nearest V-R Branch Office for Your Carbide Die Needs Now!

V-R Carbide Tools-Blanks-Dies • Tantung Cast Alloy Tools-Precision Castings • Bulldog Toolholders-Blades-Inserts

V-R CARBIDE and TANTUNG

vascoloy-ramet *corporation*

WAUKEGAN • ILLINOIS

The Wire Outlook

Sharp curtailment from many tonnage users of steel, more careful placing of orders, and steel offerings of tonnages above quotas are heralding an early return to the ready availability of steel for those independent wire mills and wire product fabricators who have been starving for the last three years.

One major motor car manufacturer has cut production schedules due to lagging sales, an indication that the sellers' market is fast fading and that prices have placed many consumer items either beyond reach or outside the pale of good judgment of many, many buyers. It is the heavy industries that are doing well. Most consumer lines are over-produced.

In this picture is seen the effect of labor having over-played its hand in two respects: securing by coercive methods more wages than the traffic could bear and in deciding collectively to do less work than is reasonable. It is our guess that as layoffs continue to add to relief rolls, the employed balance will finally awaken to the necessity of doing an honest day's work. It is hardly fair to condemn all workers; many are willing, but held in check by "rules" and the ever-watchful eyes of their union's business agents. In the face of these conditions some powerful unions are still talking about further wage and benefit demands.

Our President has done his lip service to union leaders by having his political pay-off labor bill presented to Congress. It is hardly likely to pass, even though the greatest lobbying pressure ever seen in Washington is being brought to bear on every single legislator.

The Administration's case for greater steel capacity than is now being provided by the industry is falling flat. The market is tending to achieve a balance between supply and demand, and steel capacity is being demonstrated to be more than adequate for normal requirements.

Wall Street opinion is sharply divided on the future. Some see an orderly and moderate recession extending over a few more months; others see it snow-balling into a crash. Every lay-off means fewer consumers and it is always a question as to when the mid-way point may be reached, from which depression tendencies accelerate from their own momentum. Certain it is that our production capacity is not too great, provided taxes, over-high prices, and undue unemployment do not make it impossible for consumers to buy in sufficient volume to absorb the products of industry. We do not share in the extreme pessimism of those who believe that depression is inevitable—but it can happen. It is more likely to occur if taxes are further increased and much less likely to take place, were taxes reduced and a decision made to reduce its extravagant Government spending and giving.

Declines in scrap values have been general, but it is expected that when the shake-out in scrap prices is finished, buying will be resumed. Scrap supply appears to be adequate everywhere, except on the Pacific Coast. Better sorting and classification by fabricators would be helpful to the mills.

The electric wire and cable industry is in good shape, broadly speaking—it has its weak spots. The industry was expanded and modernized during war and post-war years and, while at the moment capacity is in excess of demand, the industry is healthy and looking for more copper rods than are available.

With the winter let-up in demand for many farm products, merchant wire has been easier and furniture has been taking less spring wire and tacks. Mill backlogs are still substantial, though lower, and better rod supply has enabled many wire-drawers to carry a better inventory of wire gauges. Wire rope demand, due to the severe weather in the West has tapered off, but is expected to pick up soon. Most fastener demands fall below needs, the calls for heavier sizes being easier and for smaller sizes, far under requirements. Nails, in spite of the seasonal slackening in building, are still in very short supply. The overall picture for wire is one of continuing strength.

The copper outlook is fair; lead is very short; zinc supply has tightened; tin may become more available; and aluminum production, still far behind demand, is gradually being stepped up. The industry's great problem is power shortage.

Although we are in the midst of an orderly recession, it is our belief that a long-range perspective will sustain the trend toward higher prices—the reason is basically the size of the national debt, undiminished Government expenditures and continued wage demands.

It is high time that common sense and a spirit of public weal supplant politics and vote-getting in Washington.

—from the Editor's Desk

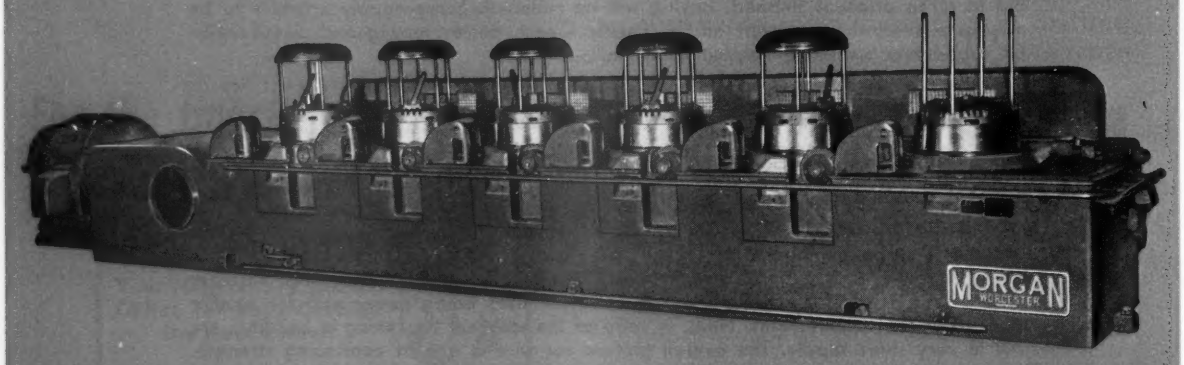
5 to 1

Not many years ago a man's production drawing No. 5 low carbon rods four drafts to No. 14 was about 500 lbs. per hour.

Multiply that figure by five and you have a fair idea of the production per man on modern

MORGAN-CONNOR
Wire Machines

How does your output stack up?



MORGAN-CONNOR
WIRE MACHINES

WM-33

MORGAN CONSTRUCTION COMPANY, Worcester, Massachusetts

WIRE AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip, Wire and Rod Products and Insulated Wire and Cable.

DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 24 MARCH, 1949 No. 3

Designated as

Official Publication By The Wire Association

Contents

Editor's Desk 227

Electric Equipment for Wire Winders, Part I, by J. G. Roby and H. R. Lloyd 231

Isothermal Heat Treating, Part III, by Dr. F. R. Morral 236

Aluminum Wire—The Alloys Appropriate to Wire Manufacture, Part I, and Discussions by D. C. G. Lees 244

Steel for the West by F. B. DeLong 248

How Would You Revise Our Labor Laws? 251

Labor Relations by John B. Stone 253

Government Information 254

Outstanding Personalities of the Wire Industry 257

A Review of Recent Wire Patents 265

Industrial Diamond Association Letter 271

Index to Advertisers 287

Where-to-Buy 288-292

WIRE and WIRE PRODUCTS is indexed regularly by Engineering Index, Inc., New York, N. Y.

— ASSOCIATE EDITORS —

Kenneth B. Lewis, Consulting Wire Mill Engineer

Lancaster, Allwine & Rommel, Consultants on Patent Information

Richard E. Brown, General Manager

R. S. Spengel, Business Manager

E. D. Sickels, Advertising Manager

Publication Office: Jersey City, N. J.

Executive Office: Stamford Trust Co. Bldg., 300 Main St., Stamford, Conn.

Annual Subscription, U. S. $5.00, Canada $5.00

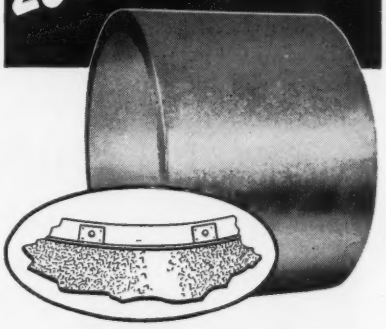
50 Cents a Copy in U. S. Issued Monthly Foreign $7.50

October Convention Issue $1.00 a Copy

January Convention Discussions Issue $1.00 a Copy

Copyright 1949, Quinn-Brown Publishing Corp. WIRE AND WIRE PRODUCTS is fully protected by copyright and nothing that appears in it may be reprinted wholly or in part without permission.

Extra strength
Extra service
and
20% less weight



NILES

"Reinforced Type"

FLANGED STEEL TRAVERSES

for wire and cable

. . . have extra strength where it is needed most—at bolt holes and base of the flange. This reinforcing makes possible the use of lighter gauge steel, saving up to 20% in weight while increasing overall strength.

Niles Flanged Steel Traverses have given as much as sixteen years' service without refinishing or major maintenance, according to actual experience records. In many cases their use has doubled the number of trips per reel before cut downs or scrapping of wooden heads.

They are manufactured in sizes up to 56" diameter and 48" traverse —in plain, painted or hot dip galvanized finishes—as light as 18-gauge steel. Width of flange and number of bolt and drain holes are furnished to your specifications. Available for prompt delivery. Write for prices.

• • •

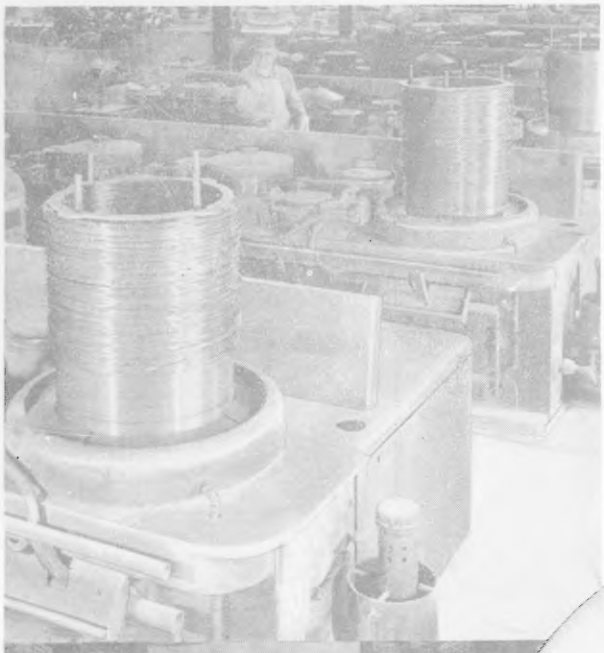
Manufactured Under License Arrangements With Western Electric Co., Inc.

REPUBLIC STEEL

NILES STEEL PRODUCTS DIVISION

REPUBLIC STEEL CORPORATION

NILES • OHIO



Firthaloy improvements

set the pace for Modern Wire Mills

Photographs of Wire Mills courtesy of The Vaughn Machinery Company

Firthaloy is constantly improving carbide die design to meet the ever-increasing speeds, rigid specifications and greater pressures of modern wire mills. Firthaloy "shirt sleeve" Field Service is on the job daily, helping customers in their own die rooms to get maximum production from their own equipment.

Call Firth Sterling

STEEL & CARBIDE CORPORATION

McKEESPORT, PA. · NEW YORK · HARTFORD · PHILADELPHIA · PITTSBURGH · CLEVELAND

DAYTON · DETROIT · CHICAGO · LOS ANGELES

IN CANADA—CHAPAT ENGINEERING & SALES, LTD.

WIRE AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip.
DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 24 MARCH, 1949 No. 3

ELECTRIC EQUIPMENT FOR WIRE WINDERS

By J. G. Roby
Steel Mill Division,
Industrial Engineering Divisions,
General Electric Company,
Schenectady, N. Y.

and

H. R. Lloyd
Machinery Division
Industrial Engineering Divisions,
General Electric Company,
Schenectady, N. Y.

PART I

An analysis of motor and power requirements for wire winders — published in two parts.

EVERY process in the manufacture and utilization of wire involves either winding and unwinding, or both. From the time a wire is drawn, it is handled in the form of a coil or reel. Thus we find that winding and unwinding play very important roles in the wire industry.

★ ★ ★

ALTHOUGH winding wire in the form of a coil is still an important process in some mills, it is the purpose of this article, primarily, to cover winding wire on a spool or reel because it is here that the most serious problems arise. In the wire industry, winding might be done as the termination of a wire processing line, such as patenting, annealing, tinning, and plating; as the termination of a fabrication process, such as stranding, and taping; or simply as re-reeling from one reel to another, or from a loose coil to a reel. Closely allied with the subject of winding wire is the subject of unwinding it.

★ ★ ★

FOUR factors must be considered when designing a winder drive. They are: (1) Wire speed, including range of variation if the speed is variable, (2) wire tension, including range of adjustment desired and accuracy which is required, (3) reel build-up, that is, ratio of the diameters of the reel full to empty and (4) the type of application and other physical considerations surrounding the reel drive, for example, whether the reel must be co-ordinated with other machines (this may determine the time of acceleration and deceleration of the reel, whether stalled tension is required, and operating duty cycle).

★ ★ ★

THE first two factors directly affect the horsepower which is required by the reel, while all four must definitely be considered in selecting the type of drive to use.

★ ★ ★

THERE are normally six basic types of applications involving the winding or unwinding of wire. Fig. 1 shows these various categories. Application Type 1 (Fig. 1) illustrates the most common winding application. Into this category fall winding reels that follow separate master machines. The wire speed may be variable, but it is set and dictated by the other machine capstan. The tension between the other machine capstan and the reel is determined, on the other hand, by the reel drive.

★ ★ ★

IN Type 2 (Fig. 1) the reel furnishes the power to pull the wire through the process. In this case, the wire speed is set by the reel drive and the tension by the friction in the system (friction blocks, friction in the system, etc.).

★ ★ ★

THE application covered by Type 3 (Fig. 1) include rewinding from a coil to a reel. This category finds wide usage in the wire industry because wire, in a large number of cases, is wound in a loose coil as it comes off a wire drawing machine. In this classification, the wire speed is controlled by the reel drive and the wire tension by "swift" breaking. (A swift is a capstan-like frame designed with a taper to pay off wire from the loose coil at a fixed diameter.)

★ ★ ★

TYPE 4 (Fig. 1) shows an unwinding drive. Here a separate machine pulls the wire from the reel. The wire speed is set by the other machine capstan while the reel drive provides wire tension. Sometimes the reel drive will be required to motor on acceleration and regenerate (or dynamic) brake during steady state or decelerating conditions.

★ ★ ★

THE next type (Type 5) is similar to Type 3, except that the rewinding is from one reel to another. Sometimes this type of drive must be reversible. This imposes the additional problem over Type 3 of dealing with a build-up change on both reels, whereas with the swift wire always pays off at a fixed diameter.

★ ★ ★

THE last type, No. 6, is similar to Type 5, except that here the wire speed is determined by an intermediate capstan. Each reel drive will set tension on that side of the capstan.

★ ★ ★

THE scope of this article covers the requirements of wire winder drives and the most general solutions only for application Types 1 to 4. Considerably more space is devoted to application Type 1 than to the other types. This is natural because the greatest number of wire winding applications fall into this category.

★ ★ ★

Requirements of Wire Winder Drives

IN order to understand why various solutions have come into prominence and enjoy wider usage than others, this article will first briefly cover the requirements of wire winder drives.

★ ★ ★

IN the majority of wire winding applications, absolutely constant tension is not necessary. Normally, the most important consideration is that there should be no slack in the wire during the reeling time, including the accelerating and decelerating periods, and that excessive tension shall not pull the wire down into previous layers or break the wire. On the other hand, there are some cases where substantially constant tension is required. For example, excessive tension cannot be tolerated with highly polished nichrome wire. Because of the polished surface of the layers of wire, the strands would be pulled under each other. In any case, however, the basic approach to a winding problem is to go in the direction of supplying a constant tension drive. The accuracy which is required will then determine the amount of refinement necessary.

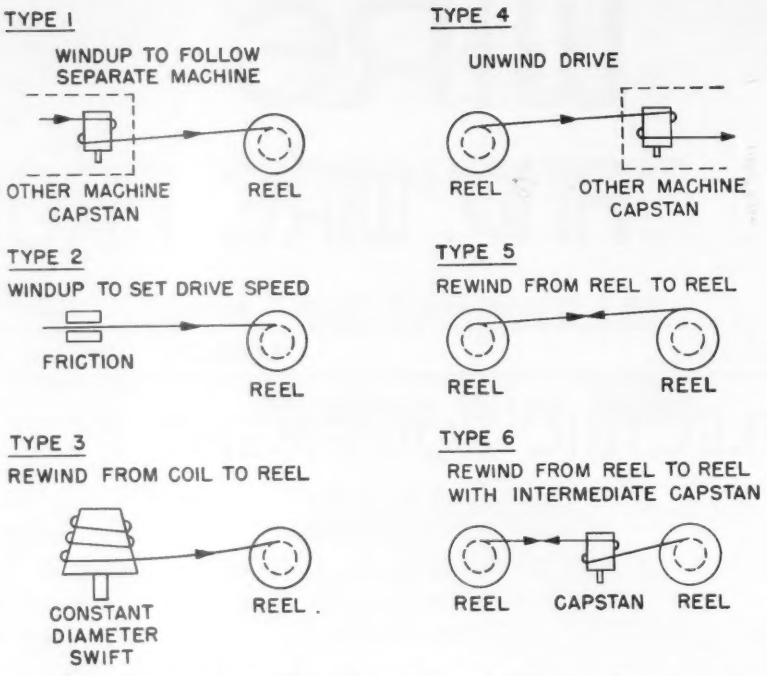


Fig. 1. Basic Types of Wire Winding and Unwinding Applications

★ ★ ★

TENSIONS vary from well under a pound for the very small wires up to hundreds of pounds for large cables. Wire speeds vary

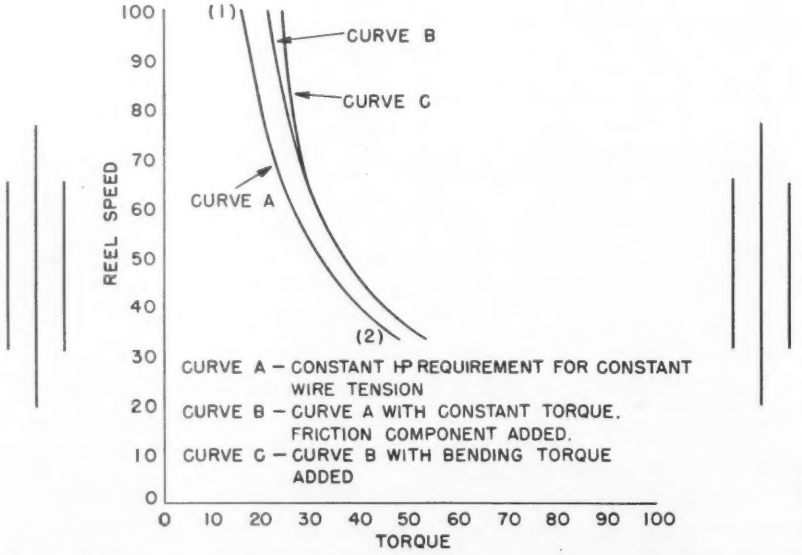


Fig. 2. Speed Torque Requirements for Reel Drive.

from a few feet per minute up to thousands of feet per minute. Drives that require the extreme limits or wide ranges cause the most "headaches".

★ ★ ★

Constant Tension by Constant Horsepower

TO maintain constant tension on a wire moving at constant speed requires constant work and consequently constant horsepower. This is shown by the formula:

$$(1)\ hp = \frac{\text{tension in lbs.} \times \text{speed in fpm}}{33000}$$

★ ★ ★

TO wind a material such as wire on a reel at a constant speed and tension requires constant horsepower input to the reel, regardless of the reel diameter. This is true because the torque of the drive must increase in proportion to the reel diameter in order to maintain constant wire tension, and for a constant wire speed the reel speed must vary inversely with the reel diameter.

★ ★ ★

FIG. 2 (Curve A) shows this constant horsepower requirement; plotting required torque versus reel speed. This shows only the requirement for maintaining wire tension. Point (1) corresponds to the maximum reel speed (no wire build-up) and point (2) to the minimum reel speed (maximum wire build-up).

★ ★ ★

Build-up Considerations

CURVE A (Fig. 2) shows a build-up of 3 - 1 on the reel. Exceeding this range sometimes imposes limitations on the type of drive that can be used, or causes costly additions that are often out of proportion to the gain. Fig. 3 shows that for a fixed maximum reel diameter (core diameter changing) "saturation" is approached at approximately 3 - 1 build-up. This curve shows the ratio of wire volume to core volume for various reel build-up ratios. A change in the build-up ratio from 3 - 1 to 5 - 1 (maximum reel diameter fixed) only increases the wire volume about five per cent.

★ ★ ★

Deviation from Constant Horsepower

REFERRING to Fig. 2, Curve B, adds a constant torque friction component to the tension requirement. Whether or not this is an important consideration will depend on the tension being held and the friction in the system. As can be seen, it tends to destroy the constant horsepower characteristic, consequently we must be aware of its effect. It becomes increasingly important as smaller wire tensions are required, and it may even overshadow the constant horsepower requirement completely.

★ ★ ★

ANOTHER factor that tends to further destroy the constant horsepower requirement is bending the wire as it is wound on the reel. At the smaller radius, additional bending torque may be required. This is shown by Curve C (Fig. 2). Whether or not this is a factor that must be considered will depend upon the wire size and material, and the radius of the reel upon which it is being wound.

★ ★ ★

THE relationship of these factors will vary widely for different conditions. Therefore, no effort was made in the case of Fig. 2 to draw these to any scale.

★ ★ ★

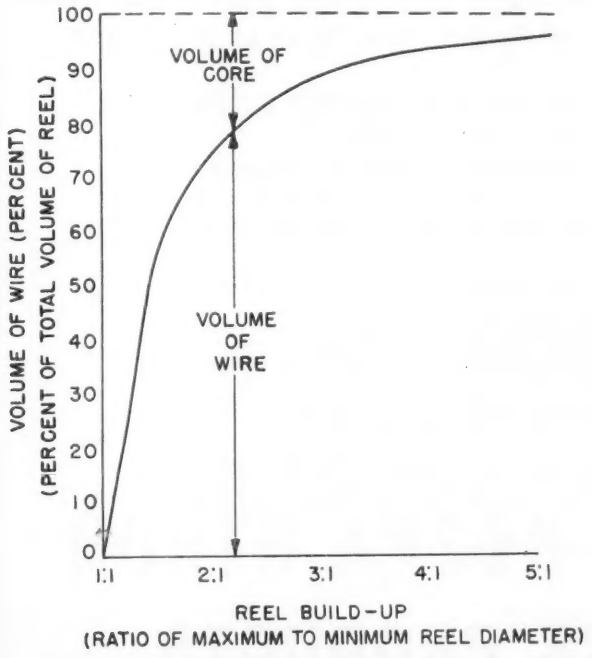


Fig. 3. Ratio of Wire Volume to Core Volume for Various Reel Build-Up Ratios.

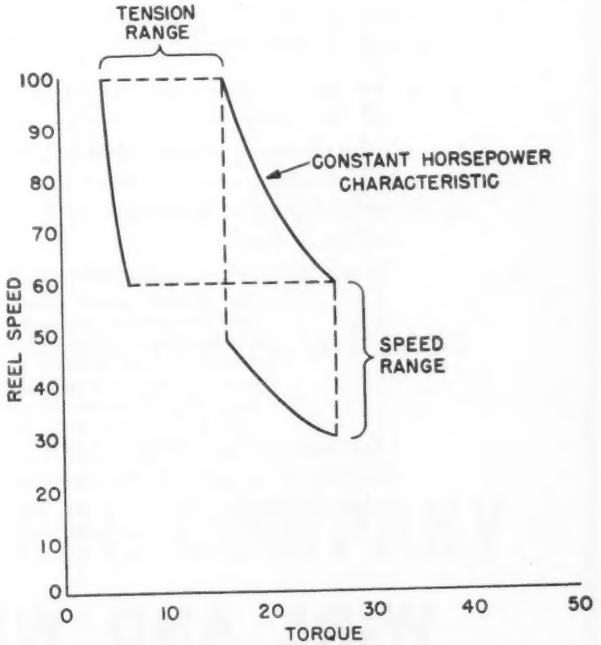


Fig. 4. Effect of Tension and Speed Change on Speed-Torque Characteristics During Reeling.

SOME applications require that tension be decreased as the reel builds-up so as not to crush the inner layers. This will further influence the shape of the resulting speed torque requirement.

★ ★ ★

TO obtain a level wind on the reel, a traverse mechanism is provided. Often this traverse mechanism is geared directly to the reel and its speed follows the reel speed. To provide for different wire sizes, a gear changer or a mechanical adjustable speed device may be provided. When the traverse is driven by the reel, it imposes another constant torque load that still further tends to destroy the constant horsepower characteristic required for constant tension. A separate drive must be provided for the traverse in order to eliminate this component from the reel drive whenever a constant horsepower regulator type of reel drive is used to obtain constant tension winding.

★ ★ ★

Wire Speed and Tension Range

IN wire winding applications, the drive must generally be capable of adjustment for various wire speeds. The total speed range required of the reel drive will be the wire speed range multiplied by build-up range. A wire speed range is encountered because different size wires are usually processed at different speeds. The larger diameter wires are usually processed at slower speeds. Likewise a tension range is often encountered for the same machine. Fig. 4 shows the effect of a speed and tension change on the speed-torque characteristic during reeling. Each curve shows a constant horsepower requirement only and does not factor in any of the components that might be encountered.

★ ★ ★

Stalled Tension

ON some equipments, tension must be maintained on the wire during stalled conditions. This is not true in every case because very often the reel is started when the capstan is started. When stalled tension is to be provided, usually it can be considerably less than normal running tension because it is often only necessary to keep the wire snug and the reel from unwinding. Therefore, it is necessary to make sure that the tension is not excessive and that the driving motor can remain stalled for the desired length of time.

★ ★ ★

Inertia Compensation for Acceleration and Deceleration

IN the majority of reeling applications, the speed of the reel must follow the speed of the wire as it comes from a capstan. Since the inertia of the capstan relative to the reel is low, the capstan has a tendency to accelerate and decelerate faster than the reel. This is particularly true when the reel has its WK^2 increased by the wire on it. In order to make the reel follow the capstan on acceleration and maintain tension in the wire, the reel motor must be forced. In other words, additional power must be obtained from the drive to compensate for the inertia of the reel. Otherwise the power which is supposed to go into tension would go toward accelerating the reel, resulting in decreased tension or slack wire. The difference between the capstan drive and reel drive Wk^2 often imposes a problem in deceleration too. In this case the result of incorrectly co-ordinated equipments is wire breakage while during acceleration it is wire slackening.

★ ★ ★

PLACE YOUR ORDER NOW for the New and Revised 1949 Edition of The WIRE AND WIRE PRODUCTS BUYERS' GUIDE.

The new and revised 1949 Edition of this very useful BUYERS' GUIDE will be ready for distribution on or about April 1st, 1949.

Subscribers to WIRE AND WIRE PRODUCTS may secure the directory at a discount of 40%. Send your order now for the BUYERS' GUIDE with your check for $3.00, or send the order and we will bill you on publication in April.

To non-subscribers, the price is $5.00 per copy.

The BUYERS' GUIDE contains 30,000 listings of all kinds of wire and wire products manufactured in the United States and lists, in addition, the manufacturers of machinery, equipment, supplies and services that are available to the wire industry.

It is an important and authoritative source of information on everything of interest to wire men. You should have it. You need it in the conduct of your business.

Members of the WIRE ASSOCIATION receive a copy of the BUYERS' GUIDE as a part of the service of the Association to them, without extra charge.

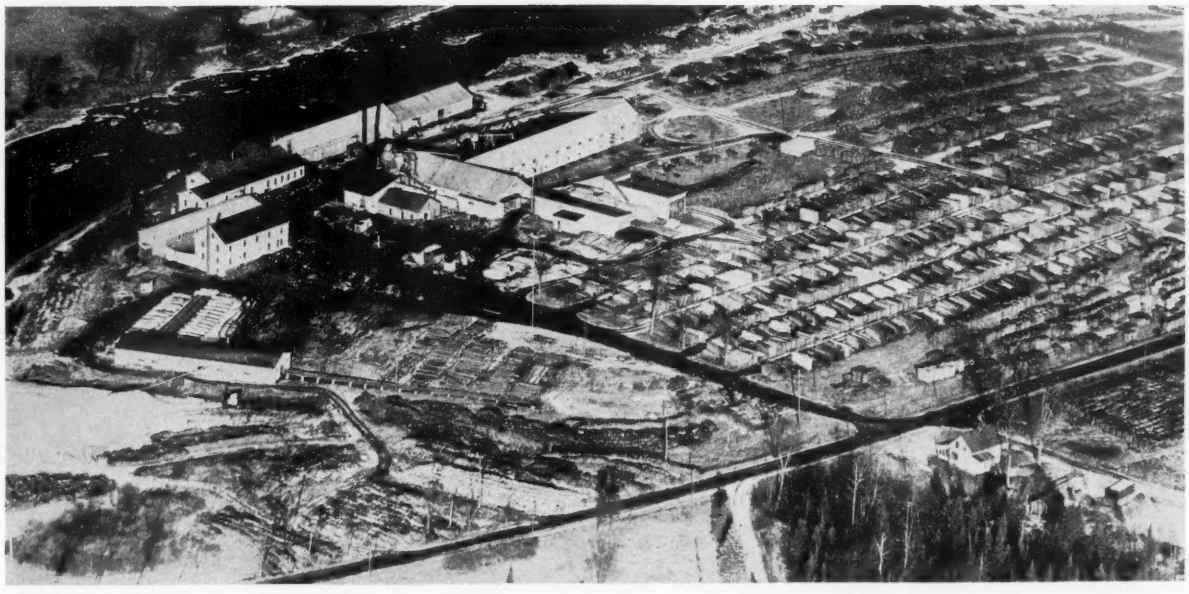
ORDER YOUR COPY TODAY

from

WIRE AND WIRE PRODUCTS

300 MAIN STREET STAMFORD, CONN.

TO SERVE YOU . . .



Airplane view of plant showing lumber stored in foreground

This modern plant offers REEL advantages that no others can claim. NARCO products available to the Wire Industry include — all-wood assembled reels, Knocked-down reels from 12" up, flanges for assembly to steel drums, metal bound reels, painting and stenciling, lagging, car blocking dimension and assemblies, lumber and kiln drying, where necessary.

If you are not using NARCO products, you are invited to contact us for prompt service.

NORTH ANSON REEL COMPANY

Established 1909

NO. ANSON, MAINE

Telephone: MADISON 187-2

ISOTHERMAL HEAT TREATING

A Compilation
by Prof. F. R. Morral, Ph.D
Dept. of Materials Engineering
Syracuse University
Syracuse, N. Y.

Part III.

T-T-T diagrams may be drawn for many of the nearly 500 analyses assembled in this article, which has been published in 3 parts. Omissions and errors brought to the attention of the author will be appreciated.

Part I was published in the January, 1949 issue of Wire & Wire Products.

Part II was published in the February, 1949 issue of Wire & Wire Products.

TABLE III - TYPE III ALLOYS

ITEM NO.	AUSTENITIZED AT °F	GRAIN SIZE	A_{e3}	A_{e1} if x A_{e1}	S_1 °F	S_1 TIME	S_2 °F	S_2 TIME	S_3 °F	S_3 TIME	S_4 °F	S_4 TIME	S_5 °F	S_5 TIME	M_s °F	F_1 °F	F_1 TIME
1	1920	3-4			1300	10^3s	1080	30s	990	35s	900	25s	400	10^5s	230	1250	10^4s
2	2370	0			1300	10^4s	1060	50s	990	70s	930	50s	520	10^4s	230	1160	1h
3	2370				1290	10^4s	1000	1m	880	5m	750	3m	410	10h	300	1200	10h
4	1650		1310	1255	1250	10^4s	1020	5m	900	10^3s	700	5m	510	10^4s		1190	10^7s
5	1650	7-8			1140	10^4s	950	10m	840	30m	660	10m	480	10^4s	430	1120	10^5s
6	2370	1			1150	10^5s	930	20m	840	1h	720	20m	540	10^4s	430	1110	50h
7	2010	4-5			1230	10^5s	1040	12m	700	10h	580	4h	400	100h			
8	1660				1320	10^4s	900	3s	670	10s	520	1s				1130	10^5s
9	1660				1190	10m	970	2s	740	7s	640	1s				1100	10^5s
10	1400				1300	1h	1050	20s								1150	2h
11	1550			x1335	1310	15h	1200	2m	950	30m	750	50s	600	2.5m	550	1250	4h
12	1650	5-7		1290	1340	10^3s	1100	30s	920	220s	940	100s	550	10^3s	300	1270	10^5s
13	1450				1300	1h	1180	45s	820	1s					820	1200	45h
14	1550	8		1315	1305	83m	1210	2m	1100	10^3s	940	7s	625	1m	510	1250	10^5s
15	1650			x1360	1270	1h	1120	10s	990	1m	780	5s	600	1m	600	1300	6h
16	1550				1370	50s	1280	12.5s	1200	30s	1000	2.5s	700	3s	570	1300	10^5s
17	1550				1375	50s	1300	25s	1175	200s	910	3s	680	10s	560	1310	10^4s
18	1550	8		1350	1300	83m	1135	100s	980	4.5s	500	200s			400	1285	10^4s
19	1550	8		1350	1260	10^3s	1150	500s	970	5s	500	5m			400	1290	10^4s
20	1550	8		1350	1300	1h	1220	800s	1040	33m	930	15s	590	800s	400	1300	14h
21	1400				1315	1h	1200	150s	1150	4.5m						1300	15h
22	1650				1300	3m	1250	140s	1130	5m	950	8s	775	10s	700	1240	10^4s
23					1300	70s	1200	40s	1100	110s	900	4s	680	10s	680	1240	10^5s
24	1700+	8		1357	1400	100s	1150	11s	1050	20s	950	12s	290	8.3h	245	1315	83m
25	1700+	8		1357	1375	100s	1200	30s	1100	40s	945	30s	300	8.3h	245	1300	83m
26	1550			x1350	1480	15m	1300	35s	1120	55s	900	1s				1300	2h
27									1300	30s	950	6s	680	14s	475	1300	12m
28					1300	90s	1250	40s	1100	100s	900	15s	700	22s	500	1300	83m
29							1300	30s	1150	18s	950	4.8s	780	10s	520	1300	33m
30	1500				1425	45m	1220	20s	1150	2m						1360	5h
31	1550	7-8		1335	1360	500s	1200	40s	1050	250s	890	8s	600	40s	530	1320	83m
32					1300	150s	1225	90s	1040	25m	900	20s	610	50s	400	1300	20m
33	1660				1300	200s	1220	55s	1110	220s	855	4.5s	670	5s	550	1275	10^5s
34	1660				1300	100s	1215	45s	1130	2m	915	4.5s	780	5s	630	1260	10^5s
35	1550	8			1300	33m	1200	200s	1050	5.5h	850	20s	675	30s	550	1300	11h
36	1550	7-8	1375	1300	1350	10^5s	1200	3m	1000	8.3h	850	12s	610	40s	560	1265	10^5s
37	1600		1400	1320	1290	500s	1160	2m	900	15s	740	11s			550		
38	1500			x1305	1320	20h	1200	3m	1100	3h	800	4.5s	600	1m	520	1240	10h
39	1800	7-8		1290	1335	10^5s	1120	5m	975	750s	800	37s	490	350s	400	1280	10^5s
40	1550			x1325	1300	4h	1180	14m	1000	30m	700	10s	500	20m	420	1290	10h
41	1800	7		1245	1400	100s	1145	15s	1010	25s	895	12s	245	3.5d	205	1120	10^6s
42	1830				1220	10^4s	1110	30m	990	10^4s	940	10^4s	790	30s	535	1150	15h
43	1950	3		1345	1420	50s	1180	3s	940	80s	800	90s	300	10h	260	1325	33m
44	1800				1350	1h	1100	15s	910	7m	790	3.2m	415	4h		1315	1h
45	1900	2-3			1400	10^5s	1240	40s	1110	1m	840	9s	590	15s	580	1300	50h

HARDNESS	°F	F_2 TIME	HARDNESS	°F	F_3 TIME	HARD.	°F	F_4 TIME	HARD.	°F	F_5 TIME	HARD.	°F	F_6 TIME	HARD.	HARD-NESS	NO
	1100	4m		950	30m		860	9m		460	10^5s						1
	1070	17m		950	50m		880	10^3s		790	10^5s		570	5h			2
	990	10^3s		800	10^5s		700	2h		480	10^5s						3
	1020	66m	V-265	660	92d					510	11.5d	V-48C					4
	970	2h		830	50h												5
	970	6h		830	10^5s												6
																	7
C-7	1050	5.5h	C-10	980	14h	C-15				825	250s	C-28	460	10^4s	C-46	C-53	8
C-7	1050	2.5h	C-10	980	14h	C-15				830	150s	C-25	480	10^4s	C-43	C-50	9
C-9	1050	10m	C-16														10
C-14	1200	1h	C-21	1100	15h	C-26	790	15h		620	1h	C-47	500	3h	C-50	C-59.9	11
C-20	1120	90s	C-41	870	1.5h	C-35				800	10m	C-39	500	10^4s	C-55	C-65W	12
	1090	8h	C-4	1000	60h		870	1h		800	2m	C-31	700	14m	C-37		13
	1170	100m	C-19	1050	4.6d	C-19	950	10^5s	C-28	875	5m	C-30	455	10^4s	C-51x		
C-12	1130	90m	C-30	980	3.2h	C-38	680	5m	C-43	300	2.3h	C-58	200	1h	C-63	C-60W	15
V-160	1250	33m	V-174	1100	8.3h	V-206				900	50s	V-300	500	10^3s	V-544		16
V-158	1250	66m	V-198	1060	10^5s	V-273	1000	10^5s	V-258	950	30s	V-300	500	10^3s	V-563		17
V-197	1200	10^3s	V-278	1125	15m	V-330				940	40s	V-380	460	10^4s	V-713		18
V-215	1200	1h	V-282	1050	11h	V-298				925	1m	V-358	450	10^4s	V-700		19
V-220	1250	1h	V-269	1040	14h	V-303	1010	14h	V-310	875	2m	V-390	415	10^4s	V-689		20
C-15	1210	1.5h	C-23	1150	3h	C-26											21
B-153	1200	2h	B-163	1160	10^4s	B-183	800	66m	B-293	700	350s	B-369	500	22m	B-408		22
B-149	1200	10^4s	B-153	1100	10^5s	B-183	780	10^5s	B-293	700	750s	B-388	500	2h	B-429		23
V-258	1240	10^3s	V-298	1040	8.3h	V-380				920	90s	V-450	420	10^5s	V-800		24
V-264	1250	1h	V-288	1090	10^5s	V-362	970	10^5s	V-383	870	200s	V-430	425	10^5s	V-800		25
C-10	1200	35m	C-19	1100	6h	C-25	900	4h	C-30	750	2.5m	C-34	670	6m	C-41	C-60+0	26
C-8	1200	200s	C-15	1000	83m	C-31				725	100s	C-39	540	10^3s	C-50		27
C-8	1260	10^3s	C-12	1000	3.6h	C-35				800	100s	C-38	525	10^4s	C-48+		28
C-4	1250	25m	C-7	1100	62h	C-23	900	10^4s	C-28	800	100s	C-39	500	10^4s	C-48+		29
	1225	14m	C-22	1150	35m												30
C-22	1200	10m	C-31	930	6h	C-31				700	900s	C-45	500	83m	C-51+		31
C-14	1250	10^3s	C-27	1000	2.2h	C-38				800	350s	C-40	400	10^5s			32
C-6	1200	83m	C-12	1060	10^5s	C-18	935	10^5s	C-29	880	4m	C-30	540	10^3s	C-44	C-54	33
C-4	1180	2.2h	C-12	1065	10^5s	C-20	920	10^5s	C-30	835	85s	C-35	550	10^3s	C-44	C-55	34
	1250	5.5h	C-7	1140	11h		900	11h	C-42	700	6m	C-47	500	10^4s		C-61	35
	1200	10^4s	C-15	1080	10^5s	C-20	750	10^5s	C-36	600	22m	C-48	400	10^5s	C-52	C-62.B	36
							800	500s		790	80s		700	30s			37
	1200	105m	C-14	1100	4h	C-22	790	15h		640	50m	C-45	500	2h	C-51	C-60	38
C-21	1180	50m	C-26	1080	10^5s	C-30	690	10^5s	C-39	540	5h	C-51	450	10^5s	C-58		39
	1200	2h	C-19	1100	10h	C-25	800	45m	C-36	700	18m	C-42	400	15h	C-55	C-64.0	40
	1100	9.3d	C-17	1080	10^6s		900	10^6s	C-31	800	700s	C-38	425	10^5s	C-56	C-62	41
	1110	12h		1030	10^5s		800	5h		650	1h		570	10^4s			42
C-36	1160	90s	C-48	800	10^5s	C-44	700	2.5h	C-50	480	10^5s	C-60					43
	1100	46m	C-49	890	1h	C-43				750	26m	C-47	500	9h	C-58		44
	1200	5h		1110	10^5s		950	10^3s		890	90s		750	3m			45

REFERENCES

1. J. R. Blanchard, R. M. Parke and A. J. Herzig, The Effect of Molybdenum on the Isothermal Subcritical transformation of austenite in low and medium carbon steels, Am. Soc. metals, Trans. vol. 29, 1941, p 317.
2. A. L. Christensen, E. C. Nelson and C. E. Jackson, A high speed dilatometer and the transformational behavior of six steels on cooling. Trans. AIME, vol. 162, 1945, 606.
3. C. J. Eddy, R. J. Marcotte and R. J. Smith, Time-temperature curves for use in the heat treatment of cast steel, Trans. A.I.M.E., 1945, Tech. Pub. No. 1846.
4. Atlas for Isothermal Transformations, United States Steel Corp., Pittsburgh, 1943.
5. P. Payson, W. L. Hoddap and J. Leeder, The spheroidizing of steel by isothermal transformation, Am. Soc. Metals, Trans. vol. 28, 1940, p 306.

Fig. 3. REPRESENTATIVE CURVES FOR TYPE III ALLOYS

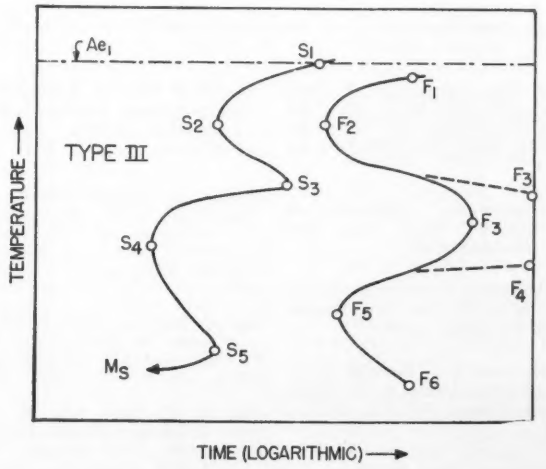


TABLE III (Continued)

ITEM NO.	AUSTENITIZED AT °F	GRAIN SIZE	A_{e3}	A_{e1} if x A_{e1}	S_1 °F	S_1 TIME	S_2 °F	S_2 TIME	S_3 °F	S_3 TIME	S_4 °F	S_4 TIME	S_5 °F	S_5 TIME	M_s °F	F_1 °F	F_1 TIME
46	1700	7-8	1600	1430	1520	10^3s	1330	15s	1100	4m	900	5s			610	1410	10^5s
47	1700				1490	10^4s	1420	10s	1300	3s	1200	2.5s	800	1.1s		1320	10^4s
48	1700				1480	10^4s	1330	5s	1240	10s	970	2s				1340	10^4s
49	1700				1480	10^4s	1300	16s	1150	160s	1060	10s	800	3s		1370	10^4s
50	2460			1450	1430	1m	1300	11s	1110	2m	1020	5s	900	4s	950	1400	10^4s
51	2460			1430	1400	10^3s	1300	1m	1000	10^4s	950	100s	850	10s	750	1390	10^4s
52	1925	2-3		1335	1320	10^3s	1100	4.5s	1020	5s	940	5s	470	4m	410	1300	10^3s
53	2000	2-3			1300	5m	1150	13s	600	10^3s	50% Trans-formation Curve						
54		7-8			1275	500s	1200	9s	1150	130s	900	10.3s	660	1m	750	1260	10^5s
55		7-8			1270	250s	1170	90s	1020	2000s	860	17s	660	45s	720	1240	4.10^4s
56		7-8			1270	500s	1170	200s	1020	50m	890	10.2s	700	15s	700	1240	10^5s
57		7-8			1250	100s	1170	1m	1080	90s	800	0.2s			800	1240	10^5s
58		7-8			1300	30s	12 40	20s	1110	1m	820	10s	660	18s	700	1250	800s
59		8-9			1200	10^3s	1050	10^4s	940	18s	880	20s	800	10s		1200	5.5h
60					1320	2h	1225	2m	1100	15m						1240	10h
61	1550	8		1317	1315	10^4s	1210	2m	1100	10^3s	940	7s	625	50s	510	1240	10^5s
62	1650	8-9	1380	1300	1370	10^5s	1170	40s	1090	45s	850	7.5s	600	30s	580	1290	10^5s
63		7-8					1175	30s	1115	70s	940	3.5s	800	5.5s			
64	1550	7-8	1380	1310	1300	10^3s	1190	80s	1070	15m	890	10s	490	1m	470	1295	10^5s
65	1500				1320	8h	1200	4m	1050	1h	800	1.5s	600	45s	530	1290	8h
66	1525	10-11	1425	1280	1375	10^3s	1200	40s	1010	4m	900	7s	585	40s	540	1280	10^5s
67					820	10^4s	820	10^3s	700	100s							
68					820	10^4s	820	10^3s	700	100s							
69	1550			x1300	1390	10h	1220	16m	1100	2h	810	8s	640	22s	640	1230	15h
70	1650			x1400	1380	6h	1170	25s	1090	35s	890	15s	580	1m	500	1300	6h
71	1750			x1425	1420	1.5h	1310	15m	1020	15h	900	3m	610	10s	610		
72	2370	-1 to 0			1400	10^5s	1240	40s	1110	1m	840	9s	590	15s	570	1280	50h
73	1600				1300	25s	1125	8s	930	30s	800	2 5s	500	400s		1300	50s
74	1600				1300	55s	1200	25s	940	2h	750	2m	500	8m			
75	1600				1300	1m	1210	40s	930	20m	780	2.5m	500	500s			
76	1600				1300	70s	1220	50s	950	50m	750	3m	500	10m		1290	500s
77	1600				1320	500s	1210	3m	950	100m	750	$4m_3$	540	10^3s		1300	83m
78	1600				1310	33m	1200	400s	840	10^5s	680	10^3s	500	33m		1260	10^4s
79	1600				1300	5.5h	1180	8m	800	2.3d	650	30m	550	33m		1270	5.5h
80	1600				1290	10^5s	1150	50m	790	5.8d	600	50m	500	10^4s		1230	5.5h
81	1600				1320	200s	1225	2m	940	5.5h	715	200s	510	10^3s		1300	33m
82	1600				1300	10^3s	1200	200s	850	36h	690	10m	590	10^3s		1280	10^3s
83	1600				1310	10^4s	1190	8m	800	3.5d	670	20m	515	33m		1265	5.5h
84	1600				1275	10^4s	1180	10^3s	800	5.8d	620	75m	500	100m		1280	10^5s
85	1600				1270	14h	800	8.1d	800	8.1d	580	2.2h	500	10^4s		1270	2.3d
86	As rcd x				1100	5s	1000	0.8s	900	7s	700	12s	600	5s		1100	10^5s
87	1600 x				1100	6s	1000	1s	900	8s	700	13s	600	5s		1100	10^5s
88	1525	9		x1346	1300	10h	1050	50s	1000	1m	850	25s	600	200s	450	1260	10h
89	1500	8	1360	1225	1280	10^3s	1030	14s	970	17s	860	13s	600	100s	520	1100	10^4s
90	1650	6-7	1365	1290	1360	10^5s	1200	70s	1000	1h	860	20s	600	70s	550	1260	10^5s
91	1550	6-7	1335	1200	1330	10^5s	1010	30s	960	50s	880	17s	600	1m	570	1150	10^5s
92	1650	6-7	1340	1170	1320	10^5s	1150	35m	1010	10h	850	25s	600	70s	610	1130	10^5s
93	1650	7-8	1385	1280	1380	10^5s	1200	5m	1010	2h	850	18s	700	30s	620	1260	10^5s

x Homoginization Treatment at ..... Austenetizing Temperature 1660°F

6. P. Payson, The annealing of steel, Iron Age, vol. 151, 1943, June 24, p 44; vol. 152, 1943, July 1, p 48; July 8, p 74; July 15, p 70; July 22, p 60.

7. M. A. Grossmann, Principles of Heat Treatment, Book, Am. Soc. Metals, Cleveland, 1935.

8. E. S. Davenport, Isothermal transformation in steel, Am. Soc. Metals, Trans. vol. 27, 1939, p 837.

9. R. M. Parke and A. J. Herzig, Hardenability of Molybdenum SAE steels, Metals and Alloys, vol. 11, 1940, p 6.

10. Metal Progress, Data Sheets.

11. J. F. Kahles, Formation and Transformation studies of iron-carbon powder alloys, Am. Soc. Metals, Trans., vol. 38, 1947, p 618.

12. J. G. Zimmerman, R. H. Aborn and E. C. Bain, Some effects of small additions of vanadium to eutectoid steels, Am. Soc. Metals, Trans. vol. 25, 1937, p 755.

13. P. Payson and J. L. Klein, The hardening of Tool steels, Am. Soc. Metals, vol. 31, 1943, p 218.

14. E. C. Bain and E. S. Davenport, Transformations of austenite at constant sub-critical temperatures, AIME, Trans. vol. 90, 1930, p 117.

15. A. Hultgren, Isothermal transformation of austenite, Am. Soc. Metals, Trans. vol. 39, 1947, p 915.

16. E. P. Klier and T. Lyman, The bainite reaction in hypoeutectoid steels, Trans. AIME, vol. 158, 1944, p 394.

17. R. M. Schmucker, Discussion to Paper on the Hardenability Concept, Trans. AIME, 1947, vol. .., 1947, p ..; or Metals Technology, Sept. 1946, p 19.

18. J. V. Russell and F. T. McGuire, A Metallographic study of the decomposition of austenite in manganese steels, Am. Soc. Metals, Trans., vol. 33, 1944, p 103.

19. Carpenter Steel Co., data sheets, 1946-1947.

F_1 TIME	F_2 HARDNESS	°F	TIME	HARDNESS	F_3 °F	TIME	HARD.	F_4 °F	TIME	HARD.	F_5 °F	TIME	HARD.	F_6 °F	TIME	HARD.	HARDNESS	NO.
10^5s	C-10	1300	500s	C-22	1100	10^5s	C-31	800	10^5s	C-35	700	10^3s	C-45	600	2000s	C-51		46
10^4s		1260	700s		1130	10^4s		990	10^4s		900	30s		700	1m			47
10^4s		1300	10m		1130	10^4s		910	10^4s		800	100s		700	90s			48
10^5s		1300	10^5s		1170	10^4s		830	10^4s		700	100s						49
10^4s	B -75	1330	30m	B -85	1050	10^6s	C-14										C-41.W	50
	B -87	1320	15m	C-18	1000	10^8s	C-25										C-50.W	51
10^4s	C-32	1120	30s	C-41	1010	40s	C-40				905	1m	C-39	630	10^3s	C-50	C-66	52
10^3s																		53
		1180	8000s	C-14	1090	10^5s	C-22				970	70s	C-54	660	400s	C-45	C-58	54
10^5s		1180	10^4s	C-15	1050	10^5s		990	500s		880	3m		750	4m	C-38	C-57	55
4.10^4s		1160	2.10^4s	C-16	1110	5.10^4s	C-24				930	200s	C-50	750	400s	C-38	C-58	56
10^5s		1180	8h	C-13	1110	10^5s	C-20				970	3m	C-44	840	2m	C-33	C-50	57
10^5s		1030	10^5s		930	5m	C-50	870	5m	C-43	700	500s	C-45				C-58	58
800s		1000	6.4d		900	10s	V-305	800	200s	V-345							V-700	59
5.5h	C-11	1175	3.5h															60
10h		1170	2h	C-18	1085	10^5s	C-19	950	10^5s	C-28	875	200s	C-30	455	10^4s	C-51+		61
10^5s	C-3	1190	15m	C-14	990	10^5s	C-28	900	10^5s	C-24	820	2m	C-34	600	500s	C-48	C-60.W	62
10^5s		1175	12m	V-248	1050	3.3h		900	200s	V-280	800	1m	V-342				V-752	63
		1200	66m	C-21	1080	10^5s	C-25	810	10^5s	C-34	610	1h	C-39	420	10^5s	C-54+	C-63	64
10^5s		1200	1h	C-20	1100	8h		800	8h	C-33	600	30m	C-44	380	8h	C-54		65
8h		1180	1h	C-20	1000	10^5s	C-29	720	10^5s	C-39	595	2.2h	C-48	570	10^4s			66
10^5s																		67
																		68
		1190	6h		1150	15h		730	15h	C-38	700	1h					C-49.W	69
15h	C-17	1200	2h	C-20	1100	4h	C-28	900	15h	C-30	650	20m	C-45	300	1.5h	C-59	C-63.W	70
6h																	C-60.O	71
		1200	5h		1110	10^5s		950	10^3s		890	90s		750	3m			72
50h		1180	20s		860	22h					600	10^3s		500	33m			73
50s																		74
																		75
		1200	4m		900	17h					590	33m		500	80m			76
		1200	6m		900	2.3d					600	100m		500	10^5s			77
500s		1180	33m		850	7d					600	10^4s		500	2.1d			78
83m		1175	83m		910	10^6s		700	10^6s		580	4h		510	55h			79
10^4s		1175	2.5h		970	10^6s		680	10^6s		590	8.3h		500	14h			80
5.5h		1225	500s		880	31h					560	87m		500	90m			81
5.5h		850	7d								560	83m		490	10^4s			82
33m		1160	33m		920	10^6s		680	10^6s		560	5h		500	6h			83
10^3s		1175	100m		950	10^6s		670	10^6s		575	5.5h		500	8.8h			84
5.5h		1150	2.5h		960	10^6s		660	10^6s		580	8.3h		500	4h			85
10^5s		800	10m		710	10^3s		600	30m									86
2.3d		1000	10^3s		800	500s		600	1h									87
10^5s	C-16	1190	400s	C-23.5	900	1h	C-31	800	400s		600	20m	C-49	500	1.5h	C-55		88
10^5s	C-16	1000	30m	C-23	890	10^4s	C-24										C-57	89
10h		1200	7m	C-17	1000	5h	C-33	750	10^5s		700	700s	C-39	600	10^3s	C-47	C-58	90
10^4s																		
10^5s		1100	20m	C-20	910	10^5s	C-29	730	10^5s		670	15m	C-33	600	20m	C-45	C-54	91
		1110	$3x10^4$s	C-23	1090	10^5s		820	10^5s		760	4m	C-35	600	400s	C-45	C-56	92
10^5s	C-6	1190	1.5h	C-20	1010	10^5s	C-35	770	10^5s		650	260s	C-40	600	5m	C-44	C-55	93
10^5s																		
10^5s																		

20. R. W. Lindsay and J. E. Atherton, Heat Treatment Study of Pearlitic malleable cast iron, American Foundryman, Sept. 1945, p 27.

21. D. B. Oakley and J. F. Oesterle, Dilatometric studies in the transformation of austenite in a molybdenum cast iron, Am. Soc. Metals, Trans., vol. 28, 1940, p 832.

22. F. B. Foote, W. C. Truckenmiller and W. P. Wood, Electrical resistance method for determination of Isothermal Austenite Transformations, Am. Soc. Metals, Trans., vol. 30, 1942, p 1359.

23. International Nickel Co. Isothermal Transformation diagrams for some constructional alloy and carbon steels, 1943; Nickel Steel Topics, March, June, September and December 1945; March and June 1946; Nickel Alloy Steels, Sect. 5, Data Sheet A, 1947.

24. J. H. Andrew, H. Lee, H. K. Lloyd and N. Stephenson, Hydrogen and transformations characteristics of steel, J. Iron and Steel Inst. (London), vol. 156 (2), 1947, p 208.

25. W. S. Pellini and B. R. Queneau, Development of temper brittleness in alloy steels, Am. Soc. Metals, Trans. vol. 39, 1947, p 139.

26. Crucible Steel Company of America, Data Sheets, 1945, 1946 and 1947.

27. E. S. Davenport, R. A. Grange and R. J. Hafsten, Influence of austenite grain size upon isothermal transformation behavior of SAE 4140 steel, Trans. AIME, vol. 145, 1941, p 301.

28. B. M. Loring, The S-curve of chromium nickel steel, Trans. AIME, vol. 150, 1942, p 283.

29. E. C. Bain, Functions of the alloying elements in steel, Book, Am. Soc. Metals, Cleveland, 1939.

30. A. R. Troiano and J. E. DeMoss, Transformation in Krupp-type carburizing steels, Am. Soc. Metals, Trans. vol. 39, 1947, p 788.

31. C. R. Austin and J. R. Doig, The suppression of pearlite in Manganese-molybdenum steels, Am. Soc. Metals, Trans., vol. 36, 1946, p 336.

32. Metal Progress, Data Sheets, Cleveland.

33. J. A. Blanchard, R. M. Parke and A. J. Herzig, The effect of Molybdenum on the isothermal subcritical transformations of austenite in eutectoid and hyper-eutectoid steels, Am. Soc. Metals, Trans., vol. 31, 1943, p 849.

34. Further developments of the end quench hardenability test. C. R. Wilks, E. Cook, and H. S. Avery, Amer. Soc. Metals, Trans., vol. .., 1945, p 1.

TABLE IV. TYPE IV ALLOYS.

ITEM	AUSTENITIZED AT °F	GRAIN SIZE	A_{e3}	A_{e1} if x A_{c1}	S_1 °F	S_1 TIME	S_2 °F	S_2 TIME	S_3 °F	S_3 TIME	S_4 °F	S_4 TIME	S_5 °F	S_5 TIME	S_6 °F	S_6 TIME	M_s °F	F_1 °F	F_1 TIME
1	1650	6½		1250	1200	12h	930	24h	820	24h	800	$6m_{5s}$	600	14s			590	1130	24h
2					1310	10^5s	1150	50m	950	10^5s	850	10^5s	600	1m				1200	10^5s
3	1500				1245	2h	1125	4.5m	1000	5h								1225	8h
4	1800			x1280	1200	1h	1140	28m	700	1h	600	12m	500	1h	390	15m	390	1200	20h
5	1650	7-9	1400	1210	1200	10^4s	1130	10^3s	1000	5h	940	5h	900	5m	800	30s	720	1160	$5x10^5$s
6	1475	7-8		1220	1200	10^5s	1100	100s	950	500s	920	100s	810	22s	500	10^3s	380	1170	10^5s
7	1850	6-8		1220	1200	2^5s	700	5h	610	1.5h	400	10^5s					200	1140	10^5s
8					1330	1h	1260	500s	1150	10^4s	1050	10^4s	950	10s				1330	10^5s
9	1560	8-9			1300	10^4s	1200	10^3s	1050	10^4s	950	100s	900	50s	700	50s		1200	7.10^4s
10	1600				1300	5s	1200	3s	1000	1s	900	0.1s	800	0.6s	700	0.3s		1300	11s
11	1600				1300	0.4s	1100	0.1s	1000	0.2s	900	0.1s	800	0.4s	400	6s		1300	30s
12	1600				1300	0.4s	1200	0.2s	1100	0.3s	900	0.1s	800	0.4s	700	0.3s		1300	10s
13	1600				1300	0.4s	1200	0.2s	1100	0.4s	970	0.1s	800	1s	400	9s		1300	8s
14	1600				1300	0.4s	1100	2s	900	0.3s	800	1s	700	0.5s	400	4s		1300	10s
15	1560				1290	3.5d	1200	83m	1050	10^6s	950	10^6s	705	5m	660	22m	550	1255	10^6s
16	1560				1275	10^6s	1200	30m	1100	10^6s	990	10^6s	760	2m	680	4m	550	1230	10^6s
17	1750			x1435	1450	1h	1325	4m	1160	1h								1380	8h
18	1700				1460	10^4s	1340	20s	1070	10^4s	1030	10^4s	930	5s	700	4s		1400	10^4s
19					1260	1h	1100	2.5m	1150	1h	830	10^4s	800	200s	700	50s			
20					1210	10^4s	1180	100m	1100	10^4s	650	10^4s	600	10^3s					
21	1700				1450	10^4s	1340	50s	1120	10^4s	990	10^4s	920	10s	700	5s		1400	10^4s
22	1700+	7	1465	1375	1360	10^5s	1230	6m	1025	10^5s	930	10^5s	800	35s	650	1m	620	1370	10^5s
23	1600+	6-7		1350	1345	10^4s	1260	1m	820	10^4s								1320	10^4s
24	2190			1440	1380	10^4s	1280	100s	970	10^4s	960	1m	800	11s			690	1320	6d
25	2190			1420	1400	10^4s	1250	1m	850	15h	780	3m	500	10^3s			420	1350	1h
26	2190			1420	1400	90s	1230	40s	800	10^4s	750	10^4s	680	30m	400	10^5s		1350	10^4s
27	2190	0-1		1380	1400	10^3s	1160	40s	800	2.10^4s	620	2.10^3s	480	10^4s			210	1290	500s
28	2190			1395	1350	10^3s	1200	9s	720	2h	620	30m	400	10^5s				1330	10s
29	2190			1440	1400	100s	1200	20s	820	10^4s	700	10^4s	650	1h	320	10^6s	200	1350	10^4s
30	2190			1350	1400	10^3s	1200	1m	670	10^7s	615	7d	570	16.6h	340	10^7s		1400	10^5s
31	2190			1450	1400	40m	1225	1m	810	10^6s								1400	10h
32	1800			1465	1500	2h	1340	55s	1150	30m							670	1445	20h
33	2100																680		
34					1450	10^5s	1310	4m	850	10^6s	430	10^6s	350	10s	155	2s		1445	10^6s
35	1800				1470	1h	1300	3m	1200	5m								1400	1h
36					1450	10^5s	1320	4m	940	10^5s	410	10^5s	290	2s				1420	10^5s
37	1600			x1490	1470	1h	1350	2.1m	1260	$4m_{5s}$								1405	$5h_5$
38	1650	7-8		1390	1380	5h	1280	10^3s	1100	10^5s	910	10^3s	700	45s			710	1350	10^5s
39					1480	20h	1350	4m	1070	20h	850	20h	750	1h				1400	20h
40	1832				1472	100s	1350	5s	950	10^5s	880	10^5s	700	4s				1450	10^5s
41	1650			x1475	1450	15m	1325	26m	1200	$4m_{5s}$								1445	15h
42	1650	7-8	1540	1480	1500	10^4s	1360	1m	1025	10^5s	860	10^5s	715	0.5s				1450	10^4s
43	1850			x1505	1490	20h	1320	8m	1100	20h	650	2h	510	1m			510	1450	20h
44	1850			x1460	1420	1h	1300	7m	1100	6h	700	10h	630	15m	400	5h	320	1360	45h
45	1600			x1490	1475	15h	1380	2.8m	1250	30m								1425	1h
46	1800				1450	20h	1300	4.5m	1100	6h	685	10h	575	50m	430	90m	425	1400	60h
47	1800			1490	1450	20h	1310	4.5m	1090	20h	690	20h	580	50m	440	1.5h	420	1400	45h
48	1600			1500	1490	15h	1375	2.5m	1250	5m								1400	3h
49	1550	9		x1305	1280	1.1h	1150	14m	1040	1h	700	10^4s	600	1h	440	10h	470	1280	2.10^4s
50	1650	6		1650	1240	24h	1100	5h	1000	24h	700	24h	600	18h			560		

35. R. A. Flinn, E. Cook and J. A. Fellows, A quantitative study of austenite transformation, Am. Soc. Metals, Trans., vol. 31, 1943, p 41.

36. C. Nagler and R. L. Dowdell, Isothermal transformation of molybdenum cast iron, American Foundrymen's Assn., Prep. 47-17, for 1947.

37. C. A. Liedholm, S. E. Lopez and W. C. Coons, Metal Progress, vol. 46, 1944, p 1096-B.

38. A. R. Troiano, PB, report 15849, 1943.

39. C. A. Liedholm, Experimental Studies of continuous cooling transformations, Am. Soc. Metals, Trans. vol. 38, 1947, p 180.

41. A. H. Cottrell, Tensile properties of unstable austenite and its low temperature decomposition products, Trans. Iron and Steel Inst. (London), vol. 151, 1945, p 93.

42. K. Winterton, The effect of overheating on the transformation characteristics of a nickel-chromium-molybdenum steel, Iron and Steel Inst. (London), Trans. vol. 151, 1945, p 79.

43. J. H. Andrew, H. L., H. K. Lloyd and N. Stephenson, Hydrogen and transformation characteristics of steel, J1 of the Iron and Steel Inst. (London), vol. 156 (2), 1947, p 208.

44. R. A. Grange, W. S. Holt and E. T. Tkac, Transformation of austenite in an aluminum-chromium-molybdenum steel, AIME, Tech. Pub. 2109, 1946.

45. G. K. Manning and C. H. Lorig, The relationship between transformation at constant temperature and transformation during cooling, AIME, Tech. Pub. 2014, June 1946.

46. P. C. Rosenthal and G. K. Manning, Heat treatment of heavy cast steel sections, Steel, Nov. 18, 1946, p 88.

47. A. Dube and S. L. Gertsman, Some metallurgical principles for the efficient heat treatment of steel, Can. Inst. Mining and Met. Trans., 1945, p 165.

HARD.	°F	F_2 TIME	HARD.	°F	F_3 TIME	HARD.	°F	F_4 TIME	HARD	°F	F_5 TIME	HARD	°F	F_6 TIME	HARD	HARDNESS	NO
	1100	20h	C-16	1050	24h		570	24h		500	9h	C-45				C-52.W	1
	1120	14h		1030	10^5s		750	10^5s		630	11h		470	10^5s			2
	1160	1.5h	C-20	1085	15h	C-31											3
	1150	3h		1000	4h		520	60h		500	25h		450	60h		C-62	4
	1110	10^3s	C-4	1020	1w		900	10m		850	500s	C-40	700	10m	C-37	C-43	5
C-22	1100	20m	C-26	1000	10^4s	C-31	900	6m	C-51	700	30m	C-39	480	5h	C-53	C-63.W	6
	1010	5.10^4s	C-37	940	$3d^5$s		700	$3d^5$s	C-52	610	2d	C-46	480	1w	C-50	C-50	7
	1250	5.5h		1150	10^5s		900	10^5s		750	110s		600	500s			8
	1160	4.10^4s		1100	10^5s		900	500s		800	4m		700	500s			9
C-10	1200	1s	C-25	900	20s	C-26	800	10s	C-29	700	20s	C-32	400	200s	C-50		10
C-8	1200	0.4s	C-22	900	20s	C-26	800	9s	C-28	700	20s	C-30	400	200s	C-48		11
C-10	1200	0.9s	C-25	900	30s	C-25	700	15s	C-30	400	80s	C-50					12
C-11	1200	0.8s	C-24	900	30s	C-29	700	12s	C-31	400	5m	C-51					13
C-12	1200	2s	C-24	920	45s	C-32	800	12s	C-34	400	200s	C-52					14
	1200	42h		1170	10^6s		795	10^6s		715	60m		570	2h			15
	1200	65h		1190	10^6s		840	10^6s		730	36m		570	2h			16
	1300	35m	C-20	1200	4h	C-26											17
	1320	10m		1200	10^4s		800	10^4s		700	200s						18
																	19
																	20
	1330	20m		1200	10^4s												21
	1245	1h	C-11	1170	10^5s	C-18	730	10^5s	C-44	620	66m	C-48	540	10^5s			22
C-31	1250	200s	C-34	1030	10^4s	C-38											23
C-20	1140	10h	C-32	940	10^7s	C-23										C-56.W	24
C-31	1230	10m	C-35	900	10^7s	C-39	650	10^5s		610	10h	C-49	510	10^5s	C-54	C-64.W	25
	900	10^7s		610	10^6s		580	24h		345	10^7s						26
	1090	5m		930	5.10^4s		730	10^3s		640	10^5s		480	10^6s			27
C-35	1220	100s	C-52	900	10^6s	C-45	600	10^6s		580	10^5s	C-53	300	10^8s	C-61	C-30.W	28
	1240	3m		880	10^7s		500	10^7s		440	23d		350	10^7d			29
	1260	12m		900	?		570	7d		430	10^7s						30
	1265	25m		950	10^7s												31
"B"-75	1340	1.5h	"B"-78	1150	15h	"B"82										C-41	32
																	33
	1280	1h		990	10^6s		270	10^6s		155	10s						34
"B"-90	1325	44m	C-14	1200	1h	C-21											35
	1000	10^6s		270	10^6s		155	10s									36
C-12	1315	29m	C-15	1260	40m												37
C-29	1270	6h	C-8	1170	10^5s	C-15	900	20m	C-56	700	700s	C-43				C-57	38
	1350	1h	"B"81	1170	20h	"B"-88											39
	1300	90s		1130	10^5s		700	10^5s		630	100s						40
	1325	16m	"B"77	1200	1.5h	"B"-65											41
C-(-6)	1350	40m	C-6	1125	10^5s	C-10	780	10^5s		700	5m	C-39	600	33m	C-40		42
	1400	4h	C-18	1300	8h	C-22				300	12h		100	1m	C-55		43
	1300	20h		1220	45h	Below Room Temperature										C-63.A	44
C-15	1380	20m	C-17	1340	60m	C-21											45
	1300	8h	C-24	1200	45h											C-62.A	46
	1300	8h	C-24	1200	45h												47
C-16	1330	22m	C-20	1250	3h	C-22											48
C-19	1180	1.5h	C-27	1040	10h	C-38	620	1d	C-48	550	5 10^4s		500	1d	C-52	C-62	49
							600	24h	C-43	500	5h	C-48				C-55.W	50

48. T. Lyman and A. R. Troiano, Influence of carbon content upon the transformations in 3% chromium steels, Am. Soc. Metals, Trans. vol. 37, 1946, p 402.

49. T. Lyman and A. R. Troiano, Isothermal transformation of austenite in 1% carbon, high chromium steels, Trans. AIME, vol. 162, 1945, p 196.

50. Effect of Molybdenum, Climax Molybdenum Co.

51. W. L. Meinhart, Low and Medium alloy cast steels, The Valve World, a Crane product, vol. 44, Feb. March 1947, p 3.

52. C. A. Liedholm, Metal Progress, vol. 45, 1944, p 94.

53. R. J. Rickett, J. G. Cutton, C. B. Bernhart and J. R. Millikin, Isothermal transformation and end quench hardenability of some NE steels, Am. Soc. Metals, Trans. vol. 35, 1945, p 22.

54. Jessop Steel Co., Data Sheet, 1947.

55. R. A. Flinn, M. Cohen and J. Chipman, The acicular structure in nickel-molybdenum cast irons, Am. Soc. Metals, Trans. vol. 30, 1942, p 1255.

56. P. Gordon, M. Cohen and R. S. Rose, The kinetics of austenite decomposition in high speed steels, Am. Soc. Metals, Trans. vol. 31, 1943, p 161.

57. J. L. Ham, R. M. Parke and A. J. Herzig, Kinetics and reaction products of the isothermal transformation of 26 per cent tungsten, 6 per cent molybdenum high speed steel, Am. Soc. Metals, Trans. vol. 29, 1941, p 623.

58. W. P. Sykes, the Ar' reaction in some Iron-Cobalt-Tungsten alloys and the same modified with chromium (Am. Soc. Metals, Trans. vol. 34, 1945, p 415.

59. L. F. Bowne, The use of direct transformation data in determining preheat and post heat requirements for arc welding deep hardening steels and weld deposits, Welding research suppl. to the Jl. of the Am. Welding Soc., vol. 25, 1946, p 234; or Research reports, vol. 11, 1946, p 234 s.

60. Brearly, The Heat Treatment of Tool Steel, Longmans, 1916, p 100.

61. Suiting the Heat treatment to the job, United States Steel Corp., 1946.

TABLE IV (Continued)

ITEM	AUSTENITIZED WT °F	GRAIN SIZE	A_{e3}	A_{e1} if x A_{c1}	S_1 °F	S_1 TIME	S_2 °F	S_2 TIME	S_3 °F	S_3 TIME	S_4 °F	S_4 TIME	S_5 °F	S_5 TIME	S_6 °F	S_6 TIME	M_s °F	°F
51	1800			x 1440	1400	3h	1250	140s	1000	10h	680	10h	600	30m	400	5h	300	1400
52	1850			x 1505	1490	20h	1320	9m	1100	20h	640	2h	510	1m			510	1440
53	1650			x 1475	1400	30m	1290	7m	1000	60h	800	2 h	600	2.5s			570	1400
54					1300	10^4s	1250	1.5h	1200	10^4s	950	200s	700	30s				
55	1700			x 1420	1400	10m	1300	40s	1120	2m	1100	20s	750	9s	600	20s	580	1350
56	1850			x 1535	1480	2 h	1400	15m	1140	45h	650	20h	530	1m				1440
57	1850			x 1535	1490	2h	1400	15m	1200	9h	650	20h	600	10m			525	1450
58	2200			x 1520	1500	5m	1460	3m	1200	5h	650	6h	550	15m	400	45m	410	1420
59	1950			x 1550	1500	1h	1400	7m	1100	15h	710	15m	600	15m	490	12m	490	1500
60	2200			x 1515	1500	5m	1450	4m	1200	6h	670	6h	550	14m	400	30m	380	1430
61	2225			x 1520	1490	35m	1400	18m	1200	6h	620	2h	550	28m	400	3h	350	1440
62	2235				1400	48m	1330	30m	1140	30h	700	30h	560	9m	420	18m	420	1350
63	1625				1500	15h	1375	4.5m	1210	4^h								1465
64	2275			x 1610			1500	800s	1100	10^6s	700	10^6s	550	33m	400	10^4s	200	1500
65	2250				1500	45m	1390	20m	1200	6h	650	3h	530	25m	400	3h	370	1460
66	2100				1390	1h	1310	12m	1200	1h							200	1500
67	2200			x 1520	1500	2h	1400	20m	1200	10h	640	10h	560	10m	400	20m	350	1450
68	2100			x 1520	1500	90m	1420	45m	1100	60h	900	60h	850	8m	710	15s	710	1500
69	2350			x 1515	1480	6h	1400	8m	1180	5h	690	1h	600	6m	400	30m	375	1440
70	2350			x 1525	1510	10m	1460	3m	1200	10h	680	10h	540	5m	400	21m	350	1470
71	1650			1545	1530	15h	1400	1m	1325	5m								1500
72	2350			1545	1520	20m	1440	9m	1180	20h	650	1h	600	4.5m	400	1.5h	375	1440
73	2235				1410	36m	1340	30m	1140	30h	695	30h	460	7m	430	9m	430	1360
74	2350			x 1560	1520	150s	1500	90s	1200	20h	660	20h	600	20m	400	2h	380	1450
75	2375			x 1525	1500	4m	1450	3m	1200	15h	690	20h	540	5m	400	17m	340	1460
76				1360	1250	30s	1025	2s	700	20s								1220
77				1360	1250	30s	1025	1 5s	650	10s								1220
78	2460				1650	30m	1470	7s	1010	50h								1650
79	2460				1580	4h	1440	1h	1185	25h								
80	2460				1515	5h	1430	3h	1240	25h								
81	1562	5	1418	x 1326	1310	250h	1200	2h	1030	250h	760	250h	660	5m	525	5m	415	1230
82	2012																500	
83	2190																464	
84	2330				1346	6m	1292	2m	1112	80m							410	
85	2012																518	
86	2190																446	
87	2330				1346	22m	1292	12m	1112	240m							410	
88	2330				1346	30m	1292	16m	1112	290m								
89	2012																752	
90	2190																536	
91	2330				1346	35m	1292	16m	1112	310m							446	
92	1700				1450	15m	1400	3m	1000	50h	900	300h	750	7m				1400
93	1700				1200	10m	1100	40m	1000	22h								1200

62. R. J. Marcotte and C. T. Eddy, The effect or Homogenization on cast steels, Trans. ASM, vol. 40, 1948, p 649.

63. W. I. Pumphrey, Jl. Iron and Steel Inst., vol. 157, 1947, p 27.

64. R. T. Howard and M. Cohen, Austenite transformation above and within the Martensite Range, Metals Technology, Sept. 1947, T. P. No. 2283 of the A. I. M. M. E.

65. D. J. Mack, The Isothermal transformation of a Eutectoid Aluminum Bronze. Metals Technology, Sept. 1947, T. P. No. 2242 or the A. IMME. Also see discussion Inst. of Metals AIME, Tech. Pub. 2398 p 16, Metals Technology, June '48.

66. G. Delbart and R. Potaszkin, Rev. de Metallurgie, vol. 43, 1945, p 84-94.

67. G. Delbart and R. Potaszkin, Jl. Iron and Steel Inst, vol. 157, 1947, p 527.

68. W. E. Hess, W. D. Doty and W. J. Childs, Jl. Welding Soc., vol. 26, 1947, p 641-s.

69. M. A. Pugacz, G. J. Siegel and J. O. Mack, Welding Jl., vol. 23, 1943, p 536-s.

70. A. C. Liedholm, A. I. Rush and W. C. Coons, Metal Progress Data Sheet, March 1948, p 392-B.

71. D. W. Rudorff, Metalurgia 24, 1941, p 88.

72. G. J. Guarnieri & J. J. Kanter, Trans. A. S. M. 40, 1948, p 1147.

73. Griffith, Pfeil and Allen, Iron and Steel Inst. (England), Special Report No. 24, 1939, p 343-367. (Paper gives transformation characteristics of some of the steels, physical properties obtainable and the effect of cooling rates on physical properties.)

74. Griffith, Pfeil and Allen, Iron and Steel Inst. (England), Special Report No. 24, 1939, p 369 (transformation characteristics of steels containing nickel, chromium, chromium-nickel and miscellaneous).

75. A. N. Alimov, N. N. Lipchin & N. F. Sivkov (Russian 1937), Iron and Steel Inst. (England), Translation No. 208, 1945, Isothermal annealing cycles, temperatures, times and hardness.

F_1 TIME	HARD.	°F	F_2 TIME	HARD.	°F	F_3 TIME	HARD.	°F	F_4 TIME	HARD.	°F	F_5 TIME	HARD.	°F	F_6 TIME	HARD.	HARD-NESS	NO.
8h	C-22	1250	9m	C-40	1100	10h	C-43	580	15h		500	8h	C-57	410	20h		C-64.A	51
15h		1390	4h	C-18	1300	8h	C-22	300	10h		100	1m					C-54.A	52
4h	C-4	1300	100m	C-17	1200	6h	C-25	790	20h		600	2m	C-50	400	15m	C-51	C-48.A	53
																		54
20h	C-12	1300	1h	C-19	1200	2h	C-26	625	30h		600	17h	C-52	560	30h		C-63	55
10h		1390	3h	C-9	1330	30h		390	45h		200	25s						56
10h		1390	3h	C-9	1330	30h		380	10h		295	1m					C-52.A	57
28h		1350	15h		1300	20h											C-55.A	58
6h	C-12	1400	30m	C-21	1300	3h	C-26										C-57.A	59
30h		1400	17h		1340	30h											C-65.0	60
8h		1400	5h	C-25	1350	8h												61
15h		1320	12h		1280	30h												62
15h		1400	3.5h	C-17	1300	13h	C-20											63
16.6h		1400	4h	C-24	1170	10^6s	C-29	650	10^6	C-55	600	3.3h	C-55	460	10^6s	C-55	C-65	64
15h		1400	5h	C-25	1340	15h												65
30h	C-23	1350	10h	C-28														66
15h		1400	8h	C-30	1360	10h												67
16h		1470	14h	C-9	1400	30h		700	6h	C-45	510	40s	C-51				C-48.0	68
25h		1395	8h	C-28	1320	25h											C-64.0	69
60h		1380	30h		1280	60h												70
15h	C-18	1390	14m	C-24	1330	30m	C-27											71
20h		1400	7h		1350	20h												72
8h		1280	30h															73
30h		1400	8h	C-24	1340	30h											C-65.0	74
60h		1380	32h		1270	60h											C-65.0	75
100s		1025	13s		770	100s												76
100s		1050	9s		700	100s												77
25h		1470	2h		1100	100h												78
																		79
																		80
250h		1200	12h	C 12	1090	250	C-18	680	60h	C-42	570	2h	C-45	480	1h	C-48	C-57.0	81
																		82
																		83
																		84
																		85
																		86
																		87
																		88
																		89
																		90
2h		1300	1h		1000	1500h		750	21d									91
3 5h		1100	35h		1000	550h												92
																		93

76. Isothermal treatment of hot ingots and forgings, I. P. Lipilin (Russian, 1937), Iron and Steel Inst. (England) translation No. 216, 1945, Cast specimens transform more slowly than forged, and these slower than rolled.

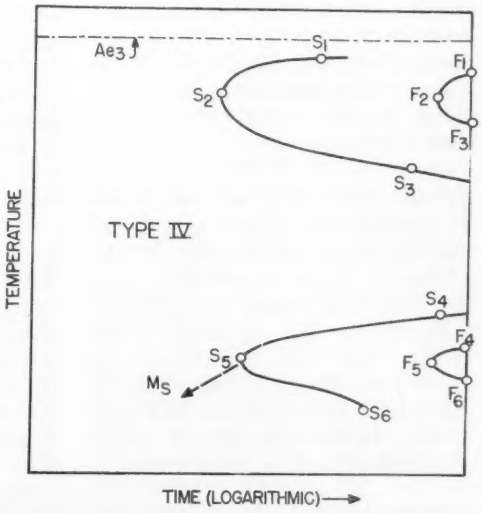
77. Heat treatment of uncooled steel and rationalization of the annealing of cooled steel. I. P. Lipilin (Russian, 1937), Iron and Steel Inst. translation No. 230, July 1935. (Isothermal annealing of uncooled ingots, and heat treatment of forgings.)

78. K. O. Nordin & E. Tholander, Suitable temperature and time for Cycle annealing, Jernkontorets Ann. 131, 1947, p 243-258.

79. G. Delbart & R. Potaszkin, Revue de Metallurgie, 43, 1945, p 84, physical properties of steel on isothermal treatments versus those obtained on conventional heat treatment.

Supplemental Information and additions to this compilation will be published at a later date.

Fig. 4. REPRESENTATIVE CURVES FOR TYPE IV ALLOYS



Aluminum Wire

THE ALLOYS APPROPRIATE TO WIRE MANUFACTURE

By

D. C. G. Lees, M.A., A.I.M., Metallurgist
Aluminum Development Association

Introductory Remarks of the Conference

Chairman Peter Smith Esq., M.W.M.A., M. Inst. B.E., M.I.P.E.
Director of the Staff School.

Part I of a series of lectures and discussions of the conference on Aluminum Wire Manufacture held in the Staff School, Frederick Smith & Company Wire Manufacturers Ltd., Caledonia Works, Halifax.

The papers and discussions presented here and in the following issues on the subject of Aluminum Wire Drawing, were presented in a series of four sessions held on this subject.

THE use of Aluminium and Aluminium Alloy wires in substitution for the traditional iron cum mild steel has been stimulated by the prolonged shortage of mild steel rods for wiredrawing. Many Wire Makers, Netting Manufacturers, Cable Makers, Barbed Wire Producers and other tentative users of Aluminium Alloy wires are of the opinion that a return to adequate mild steel supplies will end the period of interest in Aluminium. This may or may not be so; factors supporting this school of thought include:—The very high price of Aluminium Alloy wire which is **not adequately** offset by the fact that a given weight of this material goes three times as far as the mild steel equivalent; the difficulty of obtaining wire of a reasonably high tensile strain which has not also a tendency to brittleness; and the unsuitability for Aluminium Welding of equipment originally provided for the fabrication of mild steel wires.

★ ★ ★

IF, however, these and other difficulties are largely eliminated the inherent advantages of Aluminium's weight for length ratio, its high resistance to corrosion without the use of coating processes, and the decorative and other possibilities of colour anodising might well establish this type of wire in its own right in extensive replacement of mild steel.

★ ★ ★

WE have called this Conference succinctly to review in the short time available, the essential requirements and principles of Aluminium Wire Manufacture of which too little is known in the Ferrous Wire Industry, who stand to lose much should substitutes for their product be developed extensively by others.

★ ★ ★

THIS Conference can only serve as an Hors d'oeuvre or appetizer to those of us who have not yet far advanced their experience of Aluminium Wire Manufacture, and may assist us and them to further development in the various factories and so establish future policy.

★ ★ ★

I HAVE attempted no speculations upon the relationships of Copper and Aluminium wires for electrical purposes, since this is not the prime interest of a school constituted in a division of Industry serving other needs. It is hoped however, that our friends of the Non-Ferrous Wire Industry here today, may gain some little assistance from the work of the Meeting.

★ ★ ★

WE offer our grateful thanks to the Aluminium Development Association; Sir James Farmer Norton & Co. Ltd; Wire Drawing Dies (Manchester) Ltd. and Sciaky Electric Welding Machines Ltd., and the Shell Petroleum Co., Ltd. for co-operating to lead the Conference. We welcome their delegates

Mr. D. C. G. Lees, M. A., A.I.M. Metallurgist to the Aluminium Development Association.

Mr. N. Davidson, A.M.I. Mech. E., Assoc. M.C.T. Technical Director to Sir James Farmer Norton & Co. Ltd. and Director and General Manager, Wire Drawing Dies (Manchester) Ltd.

Mr. J. Hutchinson, Development Engineer, Sciaky Electric Welding Machines Ltd.

Mr. A. L. H. Perry, B.Sc. (Tech.), F.I.M. Technical Assistant, Shell Petroleum Co. Ltd.

★ ★ ★

YOU will see from the Conference Programme that the business has been divided into four sections, comprising

(1) Alloys appropriate to Wire Manufacture.

(2) Welding for Wiredrawing.

(3) Wiredrawing Machines, Dies and Lubricants.

(4) Heat Treatments.

★ ★ ★

AFTER each miniature lecture by the Leading Delegates, open discussion will be invited. Members of the Conference are asked not only to ask questions, but to make such contributions of personal experience or knowledge as is appropriate to the subject matter.

★ ★ ★

The Alloys Appropriate to Wire Manufacture

By D. C. G. Lees Esq., M.A., A.I.M.
Metallurgist to the Aluminum Development Association

THE well-known general advantages offered by aluminium and its alloys are seen to good effect in the form of wire. These advantages include lightness (combined with high strength in many of the alloys) and good corrosion resistance. Compared with some of the more traditional wire-making materials, aluminium possesses the further advantages of relative abundance at a time otherwise characterized by scarcity. Further, the price of the metal has shown much greater stability than that of many other metals.

★ ★ ★

COMPARED with pre-war days, production of aluminium wire in Britain has increased by about 150 per cent and is now about 2500 tons per annum. Apart from the very important use of aluminium-alloy rivets in aircraft and the well established application of the metal and some of its alloys as electrical conductors, post-war uses include chain-link fencing, chestnut paling, wire baskets, barbed wire, and insect screen wire. Experience shows that fully heat-treated aluminium-alloy wire tends to snap at kinks and turns owing to the high stresses set up, but the alloys which depend for their strength on work-hardening rather than heat-treatment are less susceptible to this trouble.

★ ★ ★

BEFORE proceeding to the various alloys which are available as wire, it is appropriate to discuss some matters common to all. Tolerances are at present under discussion in this country and it would be inopportune to enlarge on the subject. A proposed tentative specification for hard-drawn aluminium wire for electrical purposes published by the American Society for Testing Materials requires that wire having a diameter in the range 0.2100 to 0.100 ins. shall deviate from the specified value by not more than 1 per cent. In the range 0.1000 to 0.0360 ins., the tolerance is 0.0010 ins. and for 0.0360 to 0.0180 ins., it is 0.0005 ins.

★ ★ ★

A SPECIAL form of mechanical test appropriate for some of the alloys is a head forming test. This requires that a sample of the wire shall be flattened until the diameter of the flattened part is at least double the original for size in the range 3/32 to 7/32 ins. or not less than 1.8 times for the range 1/4 to 3/8 ins.

★ ★ ★

THE industrial use of aluminium is characterized by the existence of a large number of alloys, often in different conditions of heat-treatment. Wire has been no exception to this, although efforts are at present being made by the British Standards Institute in collaboration with the Association of Small Rivet Manufacturers to reduce the number of alloys in use.

★ ★ ★

PURE Aluminium may be regarded as the most natural material for drawing into wire, but for ordinary purposes it is not used to a great extent. Great use has, however, been made of the pure metal for electrical purposes. Thus in France and Germany many of the overhead cables for transmitting electric power are in 99.5 per cent aluminium, cored with steel for strength. The wire is in the hard state (U.T.S., 9.5-11.5 tons per sq. in.) and has an electrical conductivity over 60 per cent of that of copper. A recent proposed tentative A.S.T.M. specification for hard-drawn aluminium wire for electrical purposes requires that the material shall show not less than 99.45 per cent purity and shall give tensile strengths which increase with decreasing diameter. Thus in the range 0.2100 to 0.1601 ins. dia., the average strength required is 24,000 lbs. sq. in. (10.7 tons per sq. in.) with 2 per cent elongation on 10 ins. gauge length. As the diameter decreases the minimum strength rises, the maximum requirement being 29,000 lbs. per sq. in. (12.9 tons per sq. ins.) with 1.2 per cent elongation for wire 0.0600 to 0.0501 ins. dia. For the finest range (0.0500-0.0180 ins. dia.) the required strength is lower at 25,000 lbs. per sq. ins. (11.2 tons per sq. ins.) and there is no specified figure for ductility.

★ ★ ★

AT the end of the War much of the French "grid system" was taken down and repaired after bombing and sabotage had done their worst. The opportunity was taken to examine many of the cables which had been in service for from 15 to 25 years in districts of very different climate. Briefly it may be said that the wires showed no corrosion and there was no softening owing to spontaneous annealing. In the United States rubber-insulated aluminium wires are being offered for building installations and progress is being made along the same lines in France.

★ ★ ★

BECAUSE of the use of aluminium for electrical purposes, considerable interest has been shown in the effect of impurities in reducing the conductivity of the metal. The French worker Gauthier studied the problem of using aluminium of 99.99 per cent purity with a conductivity about 65.5 per cent of that of copper. Ten elements were investigated and it was found that iron, silicon, nickel, and zinc had only a slight effect, 0.2 per cent silicon, for instance, reducing the conductivity to 64.5 per cent copper. Magnesium, copper and silver had a greater effect. For instance, 0.2 per cent magnesium gave a conductivity of about 62.5 per cent copper. The three elements manganese, titanium and vanadium are much more deleterious. The effect of magnesium and silicon together, which brings about the formation of magnesium silicide, $Mg^2 Si$, was also studied using wires annealed

three hours at 320 deg. C. and slowly cooled. With 0.028 per cent of the compound, the conductivity was 64.95 per cent of that of copper, falling to 63.20 per cent at 0.69 per cent.

★ ★ ★

BESIDES impurity content, several fabricating variables affect the conductivity of aluminium wire, the most important being initial hot rolling temperature, preheating temperature before rolling, and the rate of deformation during rolling.

★ ★ ★

FOR the best conductivity, hot-rolling should begin in the range 410-460 deg. C. and the pre-heating temperature applied to the wire bars before rolling should not exceed 500 deg. C. Medium rates of reduction in the rod will have been stated to give better conductivity than rapid deformation. Annealing the hard-drawn wire increases the conductivity of pure aluminium wire, the highest values being reached with heat-treatment at about 300 deg. C. At this temperature 30 minutes annealing increased the conductivity of hard-drawn 99.6 per cent wire from 59.5 per cent to 62.5 per cent copper.

★ ★ ★

TURNING to the alloys of aluminium as distinct from the pure metal, the aluminium-magnesium series is probably the most important. Several different ranges of magnesium content are used, i.e. 2-3, 3-4, 4.5-5.5 and 6.5-7.5 per cent. As the magnesium increases, the tensile strength rises and the ductility falls. Thus in the lowest of the ranges mentioned (2-3 per cent) 13 tons per sq. ins. U.T.S. may be taken as an average figure for the as-drawn alloy, while 25 tons per sq. ins. is reached for the 6.5-7.5 per cent alloy. These alloys owe their enhanced strength to work hardening and are not amenable to heat-treatment.

★ ★ ★

EXPERIENCE so far suggests that the best all-round aluminium-base material for wire is, indeed, the alloy containing about 2.5 per cent magnesium, with up to 0.5 per cent manganese. No heat-treatment is required and the alloy has a tensile strength of about 13 tons per sq. in. with reasonable ductility. This alloy may be particularly recommended for outdoor use.

★ ★ ★

RIVETS are often made in the aluminium-magnesium alloys containing 5 per cent (D.T.D. 303) and (to a small extent) 7 per cent (D.T.D. 404). The 5 per cent alloy is popular with users in the aircraft industry, because effective riveting is possible without causing undue damage to the adjoining metal. As with some other alloys, intercrystalline attack may take place in this series, and the trouble is probably accentuated by stress. Exposure to tropical temperatures, e.g. 70 deg. C. causes grain-boundary precipitation of the Al-Mg phase and in this condition accelerated failure may occur. Nevertheless, very few failures of rivets have actually occurred in service and the general resistance to corrosion offered by aluminium-magnesium alloys is excellent, particularly in the presence of chlorides and carbonates.

★ ★ ★

MUCH use is made, particularly on the Continent, of alloys containing much lower percentages of magnesium, with higher silicon contents. These alloys owe their strength to the presence of compound $Mg^2 Si$ and are known under several different names, the most common of which are "Almelec" and "Aldrey". Almelec, which is produced in considerable quantity in France, contains 0.7 per cent magnesium and 0.5 per cent silicon with iron restricted to 0.3 per cent. In this alloy a compromise is made between strength and conductivity. Thus, for hard-drawn wire, the following properties are specified:

U. T. S. ..... 20 tons per sq. in.
Elongation (on 100 mm.) 6 per cent
Conductivity. 52 per cent of copper

★ ★ ★

THE added strength as compared with unalloyed aluminium makes it impossible to dispense with the steel core in overhead cables. In the investigation mentioned previously, of cables withdrawn from service it was found that no corrosion had occurred and that the heating suffered during use had not caused any softening. No significant difference was found between these cables which had been in service and others of the same batch which had been stored in a warehouse.

★ ★ ★

ALDREY, mentioned previously, contains 0.55 per cent magnesium and 0.45 per cent silicon and has tensile properties similar to those of Almelec.

★ ★ ★

CONSIDERABLE study has been devoted to the service behavior of Aldrey, particularly as regards corrosion resistance. Thus tests have been made to determine its behavior in contact with wood-impregnating materials. Tar oils and Chromate-containing salt mixtures caused little attack, but the presence of copper sulphate was found to be harmful. Aldrey has been used for overhead cables, and, more recently, as the outer return conductor for coaxial cable, when the centre was copper-sheathed aluminium.

★ ★ ★

IN the specifications for wire material now being prepared by the British Standards Institute, two alloys of the $Mg^2 Si$ type are included, one containing 0.4-0.8 per cent magnesium with 0.3-0.6 per cent silicon, while for the other alloy the corresponding figures are higher, i.e., 0.5-1.5 per cent for the magnesium and 0.75-1.3 per cent for the silicon content. In the solution-treated condition these alloys are required to give tensile strengths of 10 and 13 tons per sq. in. respectively. Copper in both these specifications is restricted to 0.15 per cent and iron to 0.6 per cent. The alloy of higher magnesium content may contain up to 1 per cent manganese and 0.5 per cent chromium. For the alloy the test procedure varies according to the temper of the material supplied. Irrespective of whether the wire is supplied hard-drawn, annealed, solution treated or fully

heat-treated, the wire must be tested in either of the two latter conditions.

★ ★ ★

AN alloy containing 1-1.5 per cent manganese as the principle alloying constituent possesses many advantages. Its resistance to corrosion is particularly good, so much so that the alloy is often used for "cladding" other aluminium alloys. Hard-drawn wire of this composition is required to give a tensile strength of 11 tons per sq. in. The manganese alloy has particularly good ductility — a great advantage in wire. This desirable property is due to the capacity possessed by the intermetallic compound Mn A16 for dissolving iron, thus preventing the formation of the embrittling compound Fe A13.

★ ★ ★

THE most widely known wrought alloy of aluminium is "duralumin", which usually contains approximately 4 per cent copper, with about 0.5 per cent each of magnesium, manganese, iron and silicon. This is examplified by B.S.2 L.37 (A.W.13 in the S.T.A.7 series) the composition ranges for which are as follows:—

Copper	3.5-4.5 per cent
Magnesium	0.4-0.8 per cent
Manganese	0.4-0.7 per cent
Silicon }	not to exceed
Iron }	0.7 per cent each.

★ ★ ★

IN the form of wire, solurion treated and aged for five days at room temperature, this alloy is required to give a tensile strength of 25 tons per sq. in. There are a number of alloys all derived essentially from the composition mentioned, which are available as wire. Thus, in one (D.T.D.327 specification) the copper content is reduced to a value within the range 1.5-3.0 per cent manganese does not exceed 0.5 per cent, magnesium is on the range 0.2-0.5 per cent, while iron and silicon are as in B.S.2L 37. When solution treated, this alloy is found to be very suitable for rivet forming and after five days ageing, the tensile strength called for is 17 tons per sq. in.

★ ★ ★

IN a further modification of the original duralumin composition the manganese content is in the range 0.4-1.2 per cent, and upper limits for iron and silicon are 1.0 and 1.5 per cent respectively. This material when solution treated is required to give at least 25 tons per sq. in. tensile strength.

★ ★ ★

AS with the aluminium-magnesium alloys, duralumin sometimes shows a tendency towards intercrystalline corrosion, and this is accentuated by retarded quenching after solution treatment and by ageing at elevated temperatures.

★ ★ ★

CORRESPONDING to Alclad Sheet, cladded wire has been made and used for insect-screen netting. The core of this wire is an aluminium-magnesium alloy and the cladding an aluminium-magnesium-silicon alloy whose thickness is about 7 per cent of the full diameter.

★ ★ ★

THE strongest aluminium alloy available as wire is probably 75S which contains zinc, magnesium, and copper as the principal alloying elements. In the fully heat-treated condition 75S has a tensile strength approaching 40 tons per sq. in.

★ ★ ★

Discussion on Alloys Appropriate to Wire Manufacture

Mr. Garner

IN Cable Making, the traditional material for reinforcing certain power cables has always been Galvanized Steel. Today we are looking into the possibilities of replacing Galvanized Steel Wire with a suitable Aluminium Alloy. Cables have to withstand the corrosive effect of a number of different agencies in soils and in atmosphere, near the coast. I should be interested to learn whether any element could be added to the Magnesium Alloys to minimize intercrystalline corrosion. I had in mind such elements as Chromium.

★ ★ ★

IN Cable reinforcing it may be necessary to bring the Aluminium Alloy into contact with metals other than Aluminium. I would like to know what dangers there are of Galvanic Corrosion arising from such contact, and what combination of metals should be avoided.

★ ★ ★

Mr. Lees

IT is true of course, that Aluminium Magnesium Alloys can suffer from intercrystalline corrosion which may also be accentuated very much by tropical temperatures such as 70°C and even more by temperatures around 100°C which may be reached by the friction which occurs between an aeroplane and the air. When the metal is held at such a temperature a precipitation of the aluminium-magnesium intermetallic compound occurs, and if that becomes excessive, the danger of intercrystalline corrosion is much greater. However, with the low percentages of magnesium such as would be used for wire there should be no danger of such corrosion.

★ ★ ★

AS regards the effect of other metals on intercrystalline corrosion, there is not a great deal of information on this subject, and claims have been made about Zinc and Chromium. The subject of Galvanic corrosion promoted by contact between Aluminium and other metals is too complex to be answered in the time at our disposal, and I think it would be best if I were to give Mr. Garner a detailed account of what is known by correspondence.

★ ★ ★

Mr. Brook

I SHOULD like to ask a question about the inter-annealing of 5%

(*Please turn to page* 282)

STEEL FOR THE WEST

By F. B. DeLong

Vice-President & General Manager of Sales
Columbia Steel Company
United States Steel Corporation Subsidiary

A paper presented at a meeting of the Pacific Gas Association in Santa Cruz, California, September 16, 1948. Printed by permission of the American Iron & Steel Institute and the Pacific Gas Association.

IT is not merely a perfunctory remark for me to say today that I am appreciative of the opportunity to come before you and talk about steel and its relation to the gas industry. I am going to use this opportunity to talk realistically and frankly about our mutual problems. I am not going to offer glowing generalities, neither am I going to "hang crepe." It seems to me that the most good for all can come from a frank discussion of steel for the West and a realistic statement of future probabilities as I see them.

★ ★ ★

I THINK we must start from a quick review of the growth of our area, since most of our current problems stem from that growth. The Pacific Coast has grown in population by 40% in seven years and people are still coming into the area. It appears from the latest data that it will be only a short time before the Pacific Coast States will reach fourteen million in population.

★ ★ ★

INDUSTRIALLY we have grown at even faster pace. Manufacturing employment on the Pacific Coast is 64% higher than it was in 1940 as compared with a population growth of 40%. This contrast denotes the speed with which our area is being industrialized. Such a rate of growth looks fantastic when compared with the Eastern and Mid-western sections of our country, but it is a fact with which all of us must reckon.

★ ★ ★

THESE growth factors have acted in this area to stress or increase a scarcity which has grown out of the war. It seems that a national shortage of any material is just that much worse in the Pacific area. We have shortages of everything from automobiles to diapers and among these are shortages of water, electricity, gas and steel to mention a few in which we are particularly interested.

★ ★ ★

I AM familiar with a few of the facts underlying the shortage of natural gas. I have read of the declining Western reserves, the falling production at the Rio Vista field, and the tremendous increase in demand. I understand that not only has there been a substantial increase in the number of gas customers, but there has also been an increase in per capita consumption.

★ ★ ★

A SEVEN year record of natural gas consumption shows a 56% increase, which is well in excess of the population growth previously mentioned. In the face of such a demand, either availability had to be increased or consumption curtailed, and I understand that long range transmission lines to bring gas from the rich fields of Texas and New Mexico is to be the answer. One line, as you all know, has already been completed and placed in service. Toward the construction of that line U. S. Steel furnished over 100,000 tons of steel. That steel, if not used for transmission pipe, could have supplied an important part of the standard pipe requirement for the Pacific Coast. However, both could not be done and therein lies an important facet of the steel shortage problem on which I shall have more to say later.

★ ★ ★

THE expanded construction of pipe lines as a transportation medium is not confined to the gas industry nor to the West. The oil and water industries are also very active in this field and the scope of the operations is international. The last comprehensive tabulation of domestic gas lines that I saw was made up this spring. It totaled 24,000 miles and would require almost 5½ million tons of steel for its completion. Since that listing was made, a number of new lines have been planned which would make these totals even greater.

★ ★ ★

MANY of the lines listed are, of course, in other parts of the country, but even these have a bearing on the Pacific Coast problem. For instance, Pittsburgh, Pennsylvania has been short of gas for some time and that shortage threatened last year to curtail steel production. Such a curtailment would undoubtedly hurt the Pacific Coast since considerable tonnage moves here from the Pittsburgh area. Columbia Steel was asked to contribute to a pool of steel plate to allow the construction of a new loop line into Pittsburgh and this we did.

★ ★ ★

GREAT as the tonnage is, the listing I referred to above tells only part of the story. It included only transmission lines, and hundreds of thousands of ad-

ditional tons of steel would be required for gathering lines at one end, and distribution lines at the other. In this connection it might be pertinent to point out the fact there is not enough pipe to allow the full expansion of all lines simultaneously. Therefore, it seems to me that we may have to take first things first and expand gathering and transmission lines before we attempt to complete the expansion of distribution lines.

★ ★ ★

I AM sure that you all recognize the fact that the expansion in pipe line capacity occasioned by the growth of the West, plus the need for moving gas over long distances, has created a demand for pipe far beyond anything ever experienced before. Furthermore, this demand has come at a time when the expansion of oil and water lines is also a vital necessity.

★ ★ ★

IT has been said by some students of the subject that the limiting factor in the growth of the Pacific Coast will be water. Every major city from San Francisco south has an important water problem and the solution in most cases involves the construction of transmission lines. This expansion must take place at the same time as the development of new gas facilities since adequacy in one would be useless without adequacy in the other. It is not conceivable that the raw materials, labor, equipment, and other things necessary to such expansion could be available in such quantities as to allow the entire job to be done in a year or two. The job is a vast one and will take time.

★ ★ ★

TURNING from that side of the picture to one I know better, the steel side of the picture, we find an equally acute problem. In this case we must consider the entire industry on at least a national basis. The reason for this lies in the fact that today, basic ingot capacity is the controlling factor. True, we came out of the war with many imbalances in the finishing end, but these are being rapidly eliminated through the building and conversion of finishing mills. The basic cause of the pipe shortage, whether it be 12″ seamless, 30″ fabricated, or common plumber's sizes lies not in the lack of pipe mills, but in the lack of ingot steel. This shortage is affecting many industries today and we can't say just when it will end.

★ ★ ★

AS a solution, some have proposed that we immediately add another ten millon tons of capacity to the 94 odd million tons of ingots that we already have, but that is not as simple as it sounds. In the first place it has been estimated that such an expansion would cost about 3 billion dollars and it is questionable if such a sum could be made available. Secondly, if the industry could raise the money, it would take several years and many hundreds of thousands of tons of steel to construct these mills which tonnage would be taken away from current availability. Finally if the money and the steel and the time were available, you would still face a severe problem on scrap supply as well as other raw materials once the new capacity was built. The raw material problems of the steel industry are so well documented in the daily press that I hardly need elaborate on them. However, I would like to comment for a moment on the scrap problem particularly on the Pacific Coast. Currently the industry here is sustaining its capacity operations based on the availability of scrap from shipbreaking operations. It now appears that by the end of this year, these operations will be discontinued and no further scrap can be expected from that source. At about the same time, additional capacity at some of the Western Steel plants is expected to come into production, thus increasing the scrap requirements. The continuation of these two factors is expected to produce an important scrap deficiency.

★ ★ ★

UNLESS we solve this problem, it may mean that Western furnaces will be operating at less than capacity next year. I want to appeal to all of you, therefore, to see that every available ton of scrap that you know of finds its way promptly to the furnaces of our Western plants. Particularly, we should look for obsolete and worn out equipment and machinery. If we fail to find adequate scrap supplies, the steel shortage may reach proportions beyond anything we have yet seen.

★ ★ ★

I'M sure you can see that on the basis of the factors mentioned above, the solution of the steel shortage through the construction of another ten million tons of capacity is simple to say, but would be very difficult to consummate.

★ ★ ★

FROM the standpoint of the economy as a whole, we are all familiar with the fact that the breaking of a bottleneck in a period of expansion almost always gives rise to the creation of a new one and in a very short time. If you will think back to our wartime experiences, you will realize what I mean. You can all recall the almost interminable succession of bottlenecks that we broke during that period. In the final analysis, we reached one which we could not break; namely, employment. Currently we have about 61 million people employed in these United States. That is nearly all the employables we have, and we are about to withdraw an important segment of that force through the draft. If we could break all the material bottlenecks in the country tomorrow, the availability of labor would place a limitation on the rate at which our economy could expand. It is just not possible to expand all of our industries at the speed we would like, and at the same time. Perhaps it is a good thing we can't because a boom of such proportions would likely be followed by a severe bust.

★ ★ ★

TO come back to the steel situation, it is true that we are currently making some important additions to our mills, not only in

(*Please turn to page* 278)

You Are Invited to be With Us for the WORCESTER REGIONAL MEETING of the WIRE ASSOCIATION

Place: Sheraton Hotel, Worcester, Mass.

Time: Friday, April 22, 1949, at 6 P.M.

Cost: Registration Fee, including Dinner—$5.00

The program to be presented under the chairmanship of Rodman R. Tatnall, Metallurgical Engineer of the Colorado Fuel and Iron Corporation, will include:

Paper: Historical Background of the Wickwire-Spencer Steel Div., C. F. & I., in which the development of machines and processes in the making of wire and wire products will be traced. Slide illustrations will supplement the talk, that will be presented by John A. Bachman of the Wickwire-Spencer Steel Division.

Motion Picture: "Indian Paint"—showing the manufacture of wire rope from ingot to finished product. Shown through the courtesy of C. F. & I.

Motion Picture: Impregnated Paper Insulated Cables—shown through the courtesy of The Okonite Company.

We want a good turn-out for this meeting. All wire men are cordially invited to attend. If you have not sent your reservation, please advise us immediately of your intention to attend and how many will be in your party.

THE WIRE ASSOCIATION

RICHARD E. BROWN, EXECUTIVE SECRETARY

300 MAIN STREET

STAMFORD CONNECTICUT

How Would You Revise Our Labor Laws?

We Americans are about to re-examine—through our Congress—the fundamental laws regulating the relations of employees, unions, and management with each other and the public.

We should be sure this examination is calm and deliberate. Any resulting revisions will be of vital interest to the whole public—to the some 15 million union members and the more than 45 million non-union workers, to union officials and management officials, to consumers and to citizens at large.

Despite any differing points of view, what all of us really seek are laws that are fair to employees, unions, and employers, and which adequately protect the public.

Let's check the question on the following page to see what are some of the individual ingredients you think should or should not be included in any law that would accomplish what we are all seeking:

In the re-examination of the present labor laws and in making any revisions, we—as American citizens—must be concerned with guaranteeing equal rights between and among individuals and organizations, while striving to eliminate force, fear, hatred and ignorance from employee—management relations.

But we must meanwhile keep always in mind that no labor law can do more than provide a reasonably favorable climate for g o o d employee-management relations. The accomplishment of those good relations must come from the will to try to spread the area of common interest and voluntary agreement.

In the exercise of your rights as a citizen in a Democracy you may want your Congressman in Washington, D. C., to know your attitude—whether "for" or "against"—on each of the above questions and any others you may have in mind. If you wish, mark the "yes" or "no" boxes, add any comments, sign your name, address and occupation and mail to your Congressman.

1. Do you believe that labor laws should, in general, preserve the employee's right to strike? ☐ **YES** ☐ **NO**

2. Do you believe labor laws should give the President of the United States the right to seek, through courts of law, to delay a strike that would cause a national emergency endangering the health and safety of the entire country? ☐ **YES** ☐ **NO**

3. When two or more unions are fighting each other over who shall do a job or who shall represent the employees, and a strike is called to compel an employer to give to the members of one union the work or recognition being given to the other union—that is a jurisdictional strike. Should labor laws prohibit such strikes? ☐ **YES** ☐ **NO**

4. Should labor laws prohibit secondary boycotts —that is, prevent an employer and his employees, where there is no labor dispute, from being damaged by a union seeking to coerce another employer having a labor dispute? ☐ **YES** ☐ **NO**

5. Should labor laws provide that an employer cannot deduct union dues or assessments from wages unless the employee gives his personal O.K.? ☐ **YES** ☐ **NO**

6. Do you believe labor laws should see to it that both employers and unions be required to bargain in good faith? ☐ **YES** ☐ **NO**

7. Should labor laws give to both employees and employers the freedom to express their own points of view on employee relations problems—provided such views, or arguments, or opinions do not promise bribes or threaten reprisals? ☐ **YES** ☐ **NO**

8. Should labor laws protect the employee against unfair practices by unions and management? ☐ **YES** ☐ **NO**

9. Do you believe that labor laws should require both union officials and company officials to swear they are not communists or fascists or members of any party or organization which plans to overthrow the government of the United States by force and violence? ☐ **YES** ☐ **NO**

10. Do you believe labor laws should require unions to make appropriate reports to members and government as to handling of funds—just as companies are required to make appropriate reports to owners and government? ☐ **YES** ☐ **NO**

11. Should labor laws make it clear that a collective-bargaining contract must be honored by both parties? And that each has an equal right to sue the other for breaking the contract? ☐ **YES** ☐ **NO**

12. Do you believe labor laws should make it unlawful for a union to compel an employer to engage in featherbedding; that is, to pay money for work which hasn't been done or won't be done? ☐ **YES** ☐ **NO**

13. Should labor laws permit the forcing of an employer to hire only workers who belong to a given union? ☐ **YES** ☐ **NO**

14. Do you believe it should be unlawful for an employee to be prevented from working by the use of violence, force or intimidation? ☐ **YES** ☐ **NO**

15. Do you believe foremen and other supervisors could properly perform their management duties of serving the balanced best interests of employees, customers and owners alike, if bargaining for supervisors by unions should be included in the labor laws? ☐ **YES** ☐ **NO**

16. Do you believe labor laws should protect individual workers in the right to join or not to join a union—to remain or not to remain members—just as they individually wish? ☐ **YES** ☐ **NO**

17. Should labor laws make clear that both unions and employers can now so affect the public for good or ill that the labor-management relations of both should be regulated equally by law? ☐ **YES** ☐ **NO**

18. Should labor laws provide that a striker who has been replaced in the course of an economic strike—not involving any unfair labor practice —be permitted to vote in an election to choose a bargaining agent at the conclusion of the strike? ☐ **YES** ☐ **NO**

Your Name .....

Address .....

Occupation .....

LABOR RELATIONS

By John B. Stone,

Washington, D. C.

The Twenty-third in a series of articles on the subject, with particular reference to problems of the wire and wire products industry. The author is a noted authority on the subject.

WASHINGTON observers of labor management relations almost unanimously express the private opinion that the pendulum has swung definitely against a fourth round wage increase in 1949.

★ ★ ★

DESPITE brave declarations by President William Green and others that labor definitely is entitled to the fourth round and will demand it, the insiders here are convinced that the labor leaders themselves will not put any heat on negotiations for further boosts.

★ ★ ★

THIS fact in itself is of interest to many manufacturers of wire and wire products. The fact that the CIO United Electrical Radio and Machine Workers probably will be the one exception to this general rule, will interest many more.

★ ★ ★

THERE are many factors working against another wage boost at this time. Employment figures are slumping, unemployment figures are on the increase. In many lines production has caught up with consumer demand and layoffs are inevitable. And the cost of living index definitely appears to be on the way down.

★ ★ ★

THIS last factor has a definite and direct result upon the wage policy of one of the biggest unions in the country, the United Automobile Workers of the CIO.

★ ★ ★

WHEN UAW President Walter Reuther negotiated his last pay raise with General Motors he inserted an escalator clause in the wage increase clause. Wages were to climb with the cost of living. On the other hand they were to descend as the cost of living descended.

★ ★ ★

NOW that the cost of living index is on the way down, Reuther must honor that contract willy-nilly. He can hardly work out two policies for his union, one for lowered wages and another for increased wages. So the entire UAW approach has been to meet management negotiators this year with no wage increase demands.

★ ★ ★

THE Amalgamated clothing workers, another of CIO's giants, has given definite indications that no wage increases will be asked this year and Philip Murray, president of the United Steel Workers, has let it be known that his members will have other things than wage increases on their minds when contracts expire.

★ ★ ★

ALONE of the large CIO unions, the Electrical workers have announced they must have wage increases and intend to press for them. Observers here do not brush these declarations off as they do the wage boost talk of William Green.

★ ★ ★

THERE is a fundamental difference between the UEW on one hand and the big CIO and AFL unions on the other expressed in the political ideologies of the organizations. UE is definitely left wing. This philosophy backs them in their drive to get everything possible in the way of wages for their members.

★ ★ ★

MANY of the other CIO unions and practically all AFL organizations believe in cooperation with management wherever possible. If employment continues to drop, they will pass off what statements they already have made indicating a demand for more wages and turn to other things.

★ ★ ★

BUT this does not mean that the other unions will approach the bargaining table empty handed.

★ ★ ★

FOR months their statisticians and researchers have been at work on various plans to further security of their members.

★ ★ ★

MOST of the AFL leaders are concentrating on two major points—shortening of the workweek to spread employment, and pension plans. They will demand these two concessions instead of wage increases. They will back up their demands with promises to cooperate further in increasing productivity if they are met, arguing that out of the increased productivity employers can more than make up for cost of the plans.

★ ★ ★

CIO LEADERS like Murray and Reuther are also interested in pension plans and insurance and pensions. Reuther already has made steps in that direction. In addition these two leaders are very much interested in the guaranteed annual wage. This proposition will be put forth with considerable seriousness by Murray this year.

★ ★ ★

WHAT this all means to an employer in a nutshell is this—with employment and cost of living both on the downgrade, labor

(*Please turn to page* 274)

GOVERNMENT WIRE PRODUCTION INFORMATION

Spiral Contractometer Measures Stress in Electrodeposits

THE spiral contractometer[1], a new direct-reading instrument developed by **Abner Brenner** and **Seymour Senderoff** of the **National Bureau of Standards**, offers a convenient and accurate method for measurement of stress in electrodeposits. Compression or tension in a specimen coating deposited on a standard helix is immediately read from a dial as the helix changes curvature in response to forces acting within the plated layer. The device is rugged and self-contained, requires no auxiliary apparatus, and is well adapted to both industrial process control and laboratory research.

[1] **For further details see "A spiral contractometer for measuring stress in electrodeposits," by Abner Brenner and Seymour Senderoff, J. Research NBS, Feb. 1948; also in Proc. 35th Annual Convention Am. Electroplaters' Soc. (1948).**

* * *

IN recent years there has been a growing realization of the importance of internal stress in the performance of electrodeposited coatings and in the quality of plated articles. Excessive stress, usually the result of the chemical nature of the plating solution or of impurities in the deposit, may cause peeling, blistering, or cracking of the coating and thus render the base metal more susceptible to corrosion. It may also induce failures due to stress corrosion and usually tends to decrease the fatigue resistance of the plated article.

* * *

IN general, the various methods that have been devised for determination of stress in electrodeposits have involved the measurement of the bending of a plated strip by means of a microscope comparator or some type of special gage. Such methods have either lacked reliability or have been too cumbersome for quality control in commercial production. The National Bureau of Standards therefore undertook the development of a direct-reading instrument based on the twisting of a helix rather than the bending of an uncoiled strip. The result was the spiral contractometer, which because of its higher sensitivity, broader utility, and greater ease of operation, is expected to find extensive application in the investigation and control of electrochemical processes.

* * *

ESSENTIALLY the new instrument consists of a flat metal strip wound in the form of a helix and mechanically connected to the pointer of a dial on which the rotation of the free end of the spiral with respect to its fixed end is indicated. The helix is connected at its upper, fixed end to a negative lead and suspended vertically in a

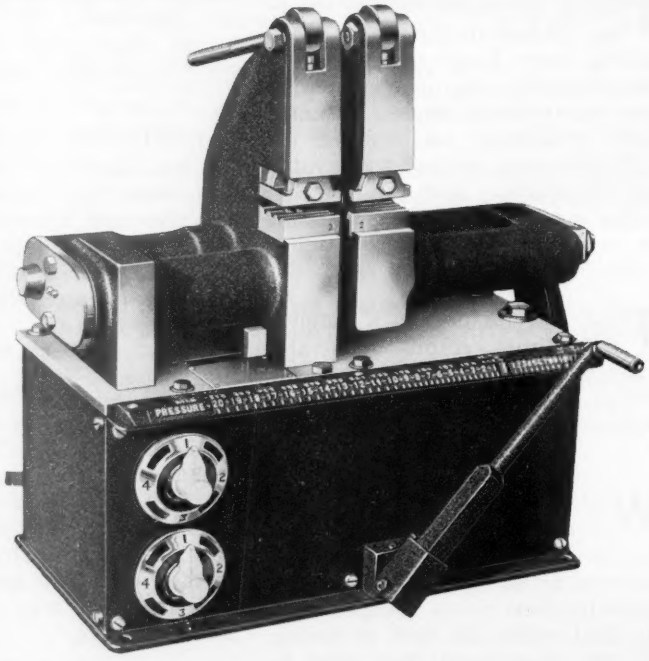
MICROMETER PRECISION — MICRO-WELD — TRADE MARK REG. U. S. PAT OFF.

MODEL T-L MICRO-WELD BUTT WELDER

Welding capacity .080" to .375 diameter STEEL wire

The Model T-L Welder which is a self-contained unit suitable for various types of Butt welding, is equipped with individual hand clamps, and a single control lever for the spacing operation, applying the upset spring tension, and contacting the welding switch.

This unit can be supplied for either bench mounting, overhead crane, or mounted on 4-wheel truck.



MICRO PRODUCTS COMPANY

20 NORTH WACKER DRIVE,
CHICAGO 6, ILL.
Telephone: STATE 7468

plating solution along with a suitable anode. As it is plated with a sample coating on the outside only, the stress in the deposit causes it to wind more tightly or to unwind, depending on whether the stress is compressive or tensile. A rod running down the axis of the helix is attached to its lower or free end so that rotation of this end due to stress is transmitted to the rod. The rotation of the rod, in turn, is applied to a gear train which produces a 10-fold magnification in the rotation of the dial pointer. The angular displacement of the rod is read directly from the dial in degrees and converted to units of stress on the basis of the calibration of the helix used.

★ ★ ★

IN making a stress determination, the helix is first cleaned and, when necessary for good adherence of the deposit to be tested, a "strike" plate is applied. After the helix has been dried and weighed, the inner side is brushed with thinned "stop-off" lacquer to prevent plating on this surface. The helix is then dipped in hot alkali and acid baths, or other preplating dips, and rinsed before it is mounted in the contractometer and immersed in the plating solution.

★ ★ ★

THE helix may be allowed to twist as plating progresses, and a record kept of the displacements with time; or twisting may be prevented until the end of the run by clamping the pointer. Both methods give the same results within the experimental error.

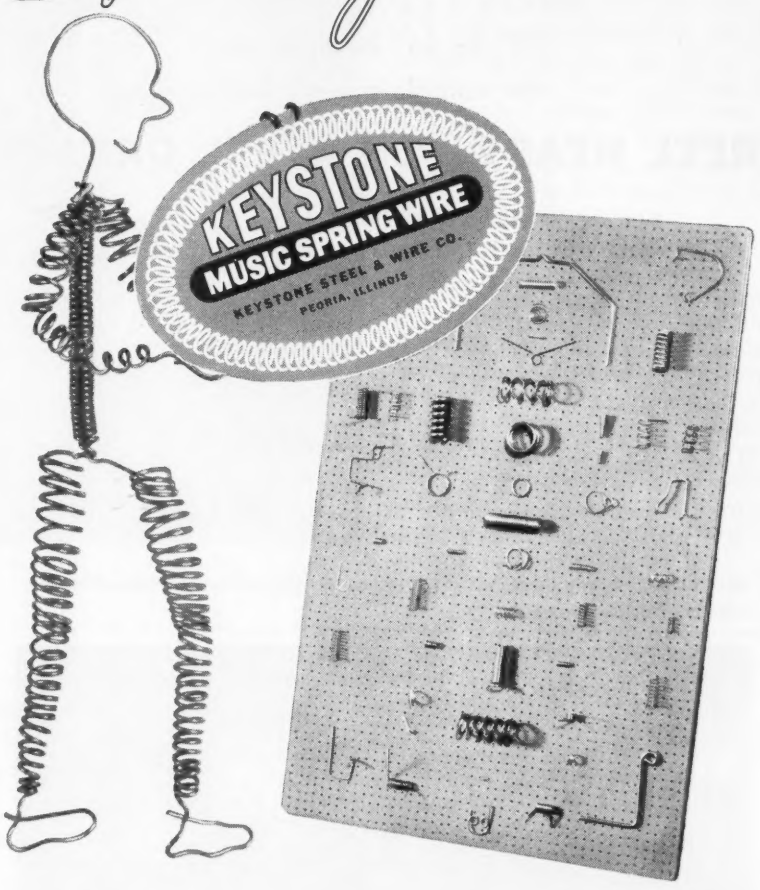
★ ★ ★

AT the end of a run the helix is taken out of the solution, cleaned, and dried, and the lacquer is removed from the inside with acetone. The deposit may then be stripped off as soon as it has been weighed to determine its average thickness. Stress is calculated from the observed deflection of the pointer, the physical constants and dimensions of the helix, and the average thickness of the coating.

★ ★ ★

A SINGLE helix can be used almost indefinitely without ap-

MUSIC
Spring Wire



Uniform by all the measurements of quality spring wire. Rigid control of chemical composition and processing methods assure its uniformity and structural soundness. Our specialized coiling, twist and bend tests are added safeguards of dependability.

You can depend on Keystone Music Spring Wire — as well as our other manufacturers' wires — to satisfy your most exacting requirements.

KEYSTONE STEEL & WIRE COMPANY
PEORIA 7, ILLINOIS

REELS made of

RETURNABLE AND NON-RETURNABLE **WOOD**

12" to 96" in diameter
for complete reels and

REEL HEADS FOR STEEL DRUMS

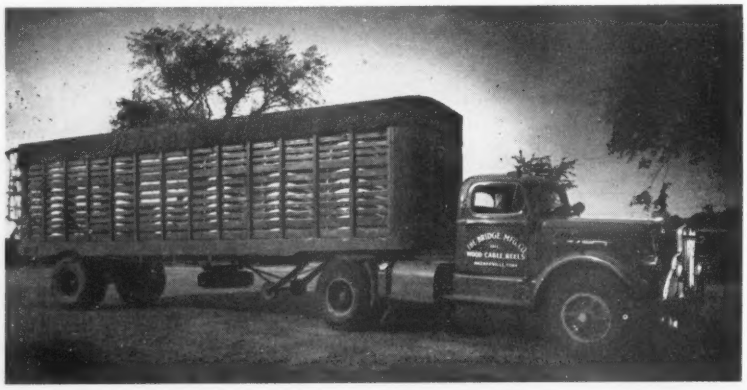
Bridge SHIPPING and SHOP REELS are furnished assembled or knocked down, made to your specifications. Built to withstand severest handling. Sturdy, strong, low in cost. Made for

CABLE,

ROPE and

WIRE

and delivered anywhere within a radius of 200 miles of Hazardville by means of Bridge trucks.



This service includes over-night delivery of reels, in case of urgent need, direct to your plant. You are invited to avail yourselves of this unique and convenient facility.

Send us your specifications and let us quote on costs.

BRIDGE MFG. CO., Inc.

HAZARDVILLE • CONNECTICUT

preciable change in its dimensions, elastic moduli, or deflection constants, provided reasonable precautions are taken in handling and storing. Between successive runs only the helix and the clamps which hold it are removed, leaving the rest of the assembly intact.

★ ★ ★

THE helix is made by winding a metal strip of uniform width and thickness on a ¾-inch steel rod in such a way as to avoid spaces or overlaps between the coils. The width of the strip is about 0.7 inch; its thickness is usually between 0.01 and 0.03 inch, depending on the rigidity required for the particular application. When the winding is completed, the ends are anchored to the rod with screws. The helix is then annealed in a vacuum in order to relieve the stresses due to cold working and thus prevent uncoiling. After annealing, the rod is mounted in a lathe, and the helix is cut off at the desired length and stretched lengthwise until the coils are separated from each other by a distance of about 0.02 to 0.04 inch. Upon removal of the inside rod it is ready for use.

★ ★ ★

STRESS determinations made with the spiral contractometer on nickel deposits are reproducible to within ±10 per cent. Values obtained with the device are in good agreement with reported values and with measurements made by procedures based on other principles. The length of strip which may be conveniently used as a helix is four to eight times that usually found in the straight-strip instruments. This gives a greater deflection for a given change in curvature, and this deflection can be magnified to any desired degree by the gear system of the instrument. In addition to the greater sensitivity thus attained, the contractometer is easily calibrated, thus simplifying calculations and eliminating errors due to variations in the physical properties of the helix. As determinations are made at the plating temperature, thermal errors are avoided. The use of a coiled strip also greatly reduces or eliminates errors caused by transverse bending.

★ ★ ★

Outstanding Personalities of the Wire Industry

J. & L. Personnel Changes

THE Jones & Laughlin Steel Corporation has announced the following personnel changes:

★ ★ ★

E. K. MILLER, formerly Assistant to the Vice President—Operations, has been appointed Assistant Vice President—Operations. Mr. Miller joined Jones & Laughlin Steel Corporation, Aliquippa Works, in 1929 as Superintendent of Steel Works, and later was promoted to the positions of Assistant General Superintendent and General Superintendent of the Aliquippa Works.

★ ★ ★

R. M. HUSSEY, formerly Superintendent of the Aliquippa Works Rod and Wire Department, was appointed Assistant Manager of Construction. Mr. Hussey has been with J.&L. since 1915. He served as Superintendent of the Electrical Department, Aliquippa Works, from 1920 until 1930, when he was appointed Superintendent of the Rod and Wire Department.

R. M. Hussey, Assistant Manager of Construction; Jones & Laughlin Steel Corp., Pittsburgh, Pa.

★ ★ ★

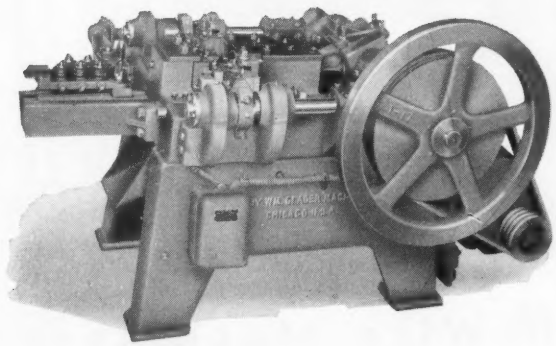
N. A. HANSEN, formerly Assistant Superintendent of the Aliquippa Works Rod and Wire Department, has been appointed Superintendent of that Department to succeed Mr. Hussey. He was first employed by J.&L. in 1926 and has been with the Rod and Wire Department since 1929.

★ ★ ★

F. D. WILKINS, formerly General Foreman of the Rod and Wire Department, Aliquippa Works, has been appointed Assistant Superintendent of the Department, to succeed Mr. Hansen. Mr. Wilkins joined the Aliquippa Works in 1927 and served in various positions until he was appointed General Foreman of the Rod and Wire Department in 1946.

★ ★ ★

GLADER HIGH SPEED WIRE NAIL MACHINE



MACHINE ARRANGED FOR INDIVIDUAL MOTOR DRIVE

High tonnage output, and low maintenance costs, have resulted in Glader Machines being accepted as standard equipment in every large nail mill built in the United States in the past twenty years.

Glader Machines are operating in most of the wire producing mills throughout the world.

These machines are made in eleven different types and sizes. This enables us to cover the range of sizes of nails produced with the greatest efficiency.

For further information please address,

WM. GLADER MACHINE WORKS
210 No. Racine Ave.
Chicago 7, Illinois
Export Dept.: 122 E. 42nd Street, New York 17, N. Y.

F. A. CAMPBELL, formerly Liaison Engineer on the Chief Engineer's staff, was appointed Superintendent of Field Construction. Mr. Campbell has many years of experience with J.&L. in the field of construction. He served as Construction Engineer and Superintendent of Construction, Aliquippa Works, from 1925 until he was appointed Liaison Engineer last September.

★ ★ ★

H. H. MORGAN, formerly Roll Designer, has been appointed Assistant Roll Engineer. Mr. Morgan has been with J.&L. since August, 1945. He came to the Corporation from the Iron and Steel Division of Kaiser Company, Incorporated.

★ ★ ★

Wheeler Moves to Waterbury

IT has been announced that **The Wheeler Insulated Wire Company, Inc.** moved from Bridgeport to Waterbury, Connecticut, in January, 1949. Wheeler has been located in Bridgeport since its founding in 1906. The company became a division of The Sperry Corporation in 1943.

★ ★ ★

COMMENTING on the move, **George B. Horn,** Vice President, said "We've been in Bridgeport for a good many years, but I think this move to Waterbury is to everyone's advantage. We'll have considerably larger, more modern facilities and we'll be better able to serve our customers, both from a manufacturing and a delivery standpoint."

★ ★ ★

AT the same time announcement was made of two promotions. **George B. Horn,** formerly Secretary and Assistant General Manager, has been named Vice President. **George T. Mumaw,** formerly Treasurer, has been appointed Secretary and Treasurer.

★ ★ ★

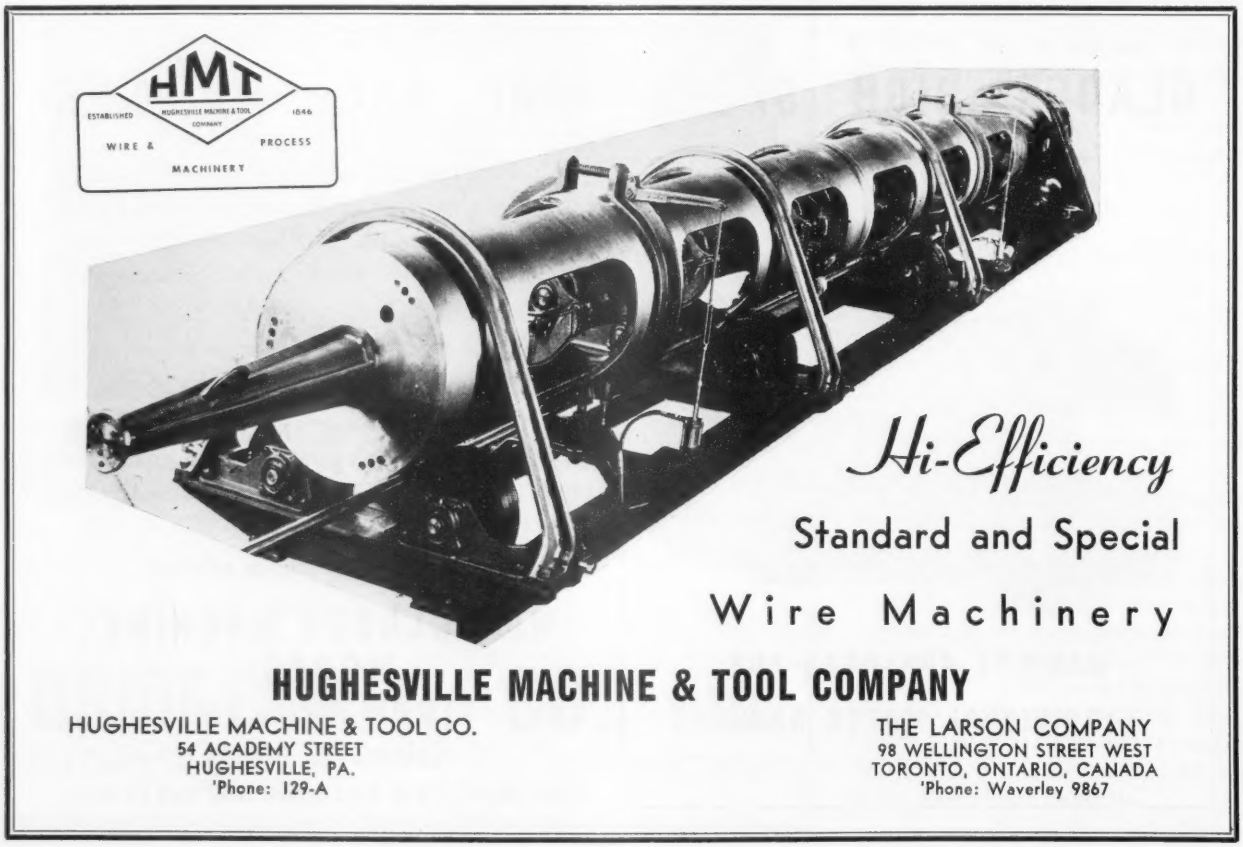
THE move to Waterbury involved transferring the manufacture of magnet wire, electrical coils, transformers and fluorescent ballasts to Waterbury where, for the past several months, Wheeler has been producing its complete line of sound-powered telephones and handsets. Wheeler now occupies a new, large factory and office building on East Aurora Street in Waterbury. Their new facilities will provide more adequate space to handle Wheeler's expansion in electronic and television fields.

★ ★ ★

Youngstown Sheet & Tube Co. Appointments

JOHN D. ANDERSON has been appointed superintendent of the rod, wire and conduit departments at the Struthers, O., plant, **Youngstown Sheet & Tube Co.,** Youngstown. He joined the company in 1926 as an inspector in the sheet galvanizing department. Since 1944 he has been assistant superintendent of the Struthers merchant mills.

★ ★ ★



Donachie Made Works Manager of The Beryllium Corporation

OTTO T. ENGLEHART, President of **The Beryllium Corporation,** Reading, Pennsylvania, announced the appointment of **Matthew J. Donachie** as Works Manager effective January 15, 1949. Mr. Donachie has been associated with the Company in various consulting capacities since 1935.

★ ★ ★

SINCE coming to this country from Scotland in 1926 Mr. Donachie has been associated with several leading firms in the United States as a consulting metallurgist. He is an alumnus of the Technical College, Coatbridge, Scotland, and Franklin Union Institute, Boston, Massachusetts.

★ ★ ★

Northern Electric Company Changes

FOUR senior appointments have figured prominently in an extensive personnel reorganization in the wire and cable division of the **Northern Electric Company, Ltd.** Effective January 1, **R. G. Harries,** formerly shop superintendent, has been appointed works superintendent of the division's Shearer street plant in Montreal, and is now responsible for the operating, production control, mechanical engineering, and methods engineering departments.

★ ★ ★

MR. HARRIES will report to H. Miller, works manager of the division, as will **A. M. Croll** who has been appointed works superintendent of the Lachine plant. Formerly personnel superintendent of the division, Mr. Croll is now responsible for the operating, production control, mechanical engineering departments and plant services of the plant. He will also have the supervision of all staff, outside of his own organization, resident at Lachine, on a discipline and service basis and will be responsible for co-ordinating the activities of all departments at Lachine in consultation with the superintendents concerned.

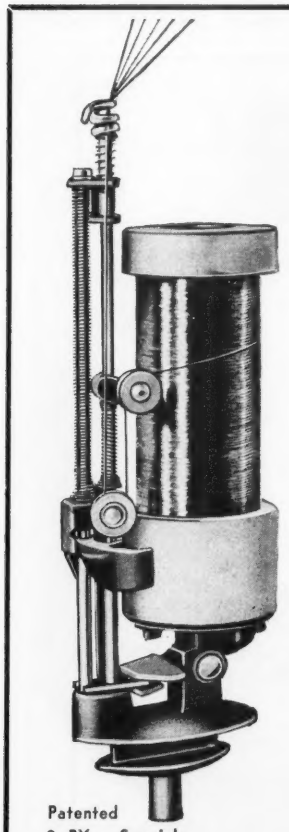
★ ★ ★

CO-INCIDENT with the appointments of Mr. Harries and Mr. Croll, **G. K. Reynolds,** formerly acting Lachine plant superintendent, was appointed personnel superintendent of the division, while **E. D. Bent** was made assistant chief engineer. Mr. Reynolds will report directly to W. H. Eastlake, manager of the wire and cable division.

★ ★ ★

MR. HARRIES joined the company on September 1, 1916, in the cable production department, and following extensive experience in several departments of the division was made shop superintendent in 1935. He is a member of several social and business groups and organizations, including the Montreal Board of Trade.

★ ★ ★



Patented
2 BX - Special
MOSSPEED Carrier

MOSSPEED BRAIDER CARRIERS
FOR BRAIDING
MULTIPLE ENDS OF FINE WIRES

A special design MOSSPEED CARRIER and BOBBIN is supplied for braiding "SHIELDED" WIRE, ETC.

Will braid multiple ends of aluminum, brass, bronze or copper wire, etc.

TWO SHEAVE-WHEELS and SPECIAL-TOP-THREADEYE on carrier, together with new type BOBBIN provides an even wire "let-off" resulting in a high quality and uniform braided shield.

Consult our engineers regarding your braiding problems

MOSSBERG
Pressed Steel Corp.
18 WEST STREET
ATTLEBORO, MASSACHUSETTS, U. S. A.

European Agent
James Day (Machinery), Ltd., "Ford House," 88 Regent Street, London, W.I., England

MR. CROLL has been with Northern Electric since February 19, 1919, starting with the rubber insulating department. Prior to his appointment as divisional personnel superintendent, he was accountant for the division for more than four years. He served with the Royal Highlanders of Canada (Black Watch Regiment) during World War I.

★ ★ ★

MR. REYNOLDS, who was born in Winnipeg, joined the wire and cable division of the company in 1935 as a design engineer. After serving with the Canadian Army from 1939 through 1945, including five and a half years overseas, he returned to the company. He was appointed Lachine plant superintendent (acting) in 1947. He is a member of the Corporation of Professional Engineers of Quebec. Prior to World War II, he was active in badminton circles, and was provincial singles champion in 1933 and 1936.

★ ★ ★

MR. BENT was graduated from Acadia University with a B. Sc. degree in 1928, and after serving as a hydrographer in the Hydrographic Service of Canada and physicist in the Physical Testing Laboratory at Ottawa, joined the company in September, 1929. He was put in charge of the wire and cable laboratories in 1941 and made design and development engineer in 1947. He is a member of several organizations, including the Corporation of Professional Engineers of Quebec and Chemical Institute of Canada. He is also an associate member of the American Institute of Electrical Engineers and is a past chairman of the Quebec Rubber and Plastics Group.

★ ★ ★

A. C. Belles Becomes Assistant to D. D. Buchanan

THE appointment of **A. C. Belles** as assistant to the manager of operations of the **Union Drawn Steel Division of Republic Steel Corporation** was announced in January by **D. D. Buchanan,** manager of operations.

★ ★ ★

MR. BELLES, who has been superintendent of the Beaver Falls plant of Union Drawn, will be succeeded by **T. M. Girdler, Jr.,** who has held the position of assistant superintendent.

★ ★ ★

IN his new position Mr. Belles will work with all Union Drawn plants on mechanical problems. He has been with Union Drawn Steel Division and predecessor companies since 1902 and has spent his entire time in the Beaver Falls plant. For the present he will continue his residence in Beaver Falls.

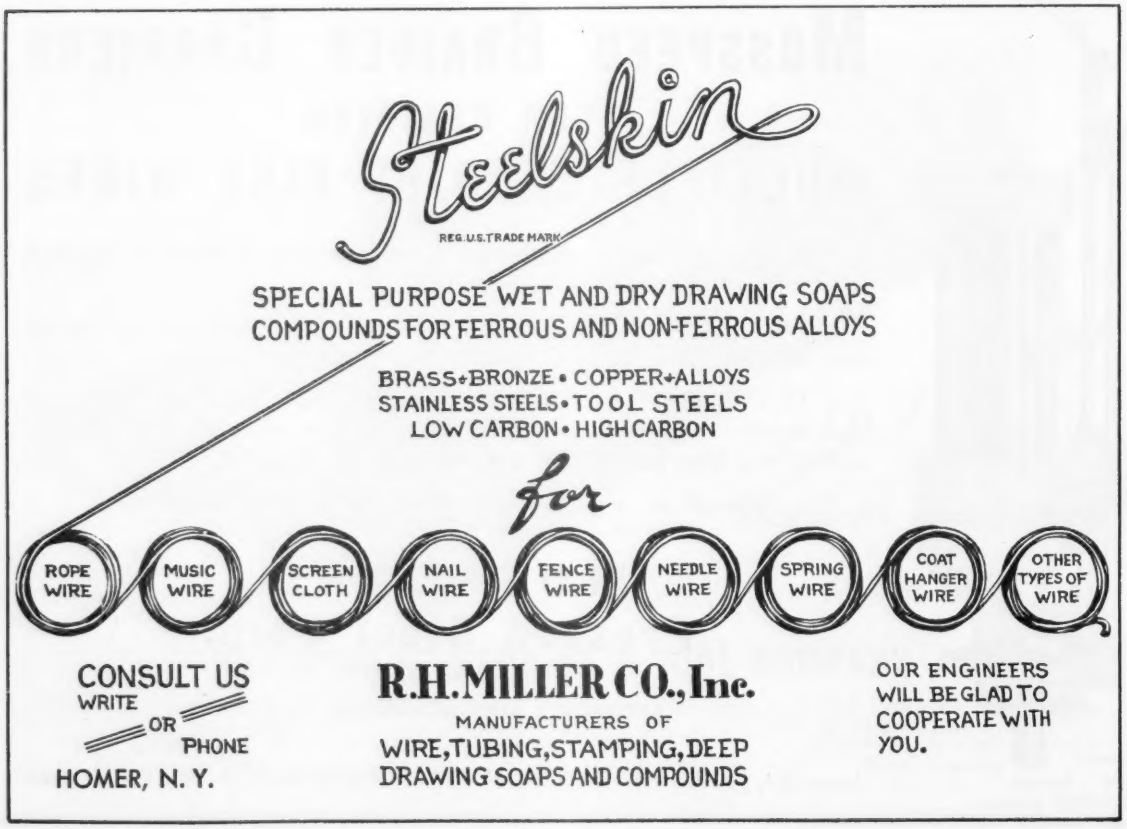
★ ★ ★

MR. GIRDLER joined Union Drawn after three years in the army.

★ ★ ★

HE was born in Atlanta, Georgia, and is a graduate of the University of Michigan with the degree of bachelor of science.

★ ★ ★



A. T. Walker Joins Belden 25-Year Club

A. T. WALKER, industrial sales engineer of the **Belden Manufacturing Company,** maker of electrical wire and cable products. was inducted into the company's 25-Year Club at a dinner meeting in Chicago. He received a gold watch to commemorate his quarter century of service.

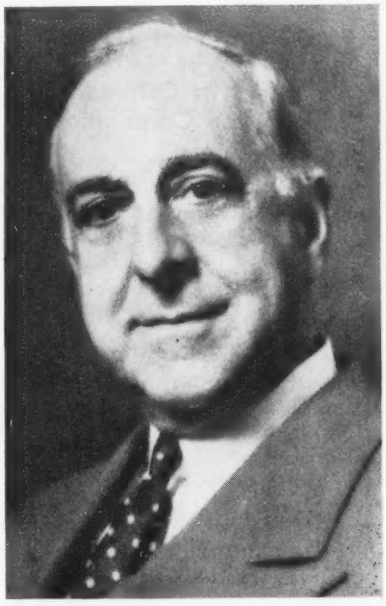
★ ★ ★

WALKER, who lives at Riverside, Connecticut, and covers New York and New England territory, joined Belden in 1923 as a clerk in the shipping department. In 1927 he entered the sales division. He is a graduate of Yale University Sheffield Scientific School.

★ ★ ★

Floyd Rose Retires as Chairman of Firth-Sterling

AT the year-end meeting of the Board of Directors of the **Firth Sterling Steel & Carbide Corp., Floyd Rose** retired as chairman of the board, effective December 31. Mr. Rose, who had occupied the post since October, 1945, stated that his retirement was in line with an arrangement made last July. He will continue as an active member of the board.



Floyd Rose, Firth Sterling Steel & Carbide Corp.

★ ★ ★

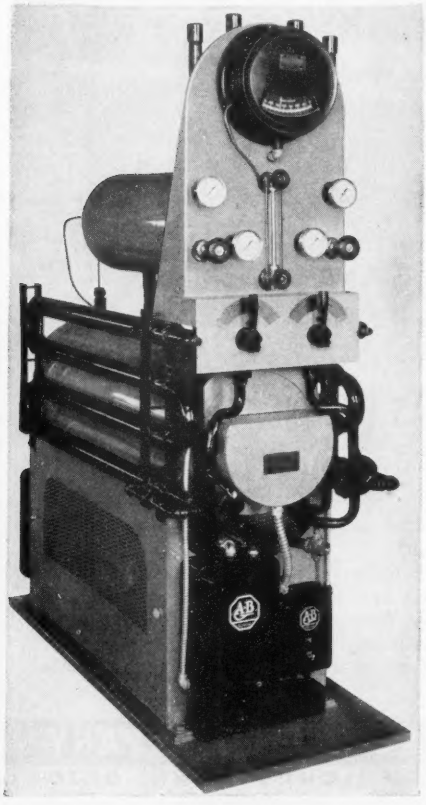
E. J. Walsh to Manage Boston Office for A.S.&W.

EDMUND J. WALSH has been appointed assistant manager of sales in the Boston sales office of the **American Steel & Wire Co.,** U. S. Steel subsidiary.

★ ★ ★

BORN in Worcester, Mass., Mr. Walsh has been associated with the Wire Company in both that city and at Boston. He started in the Worcester office as a clerk in the order and warehouse department in September, 1928. Since September, 1936, he has been located in Boston where he has held a number of positions. He has been office manager at that office since June, 1946, and assumes his duties as assistant manager of sales immediately.

★ ★ ★



THE ROYLE TEMPERATURE CONTROL UNIT

For Extrusion and Other Industrial Uses

A compact, simply operated unit designed to sustain any pre-determined temperature between 90°F and 475°F.— Hand-lever selection of desired temperature — Heat supplied — or drained —according to operational requirements — Formed piping, elimination of gaskets, and drip pans promote cleanliness — Breakdown of heat transfer oil reduced to a minimum — Two standard sizes 32KW, 48KW— Other units with water circulation and refrigeration for operations requiring constantly maintained lower temperatures, 35°F to 200°F.

JOHN ROYLE & SONS ROYLE PATERSON N. J.

PIONEER BUILDERS OF EXTRUSION MACHINES SINCE 1880

London, England James Day (Machinery) Ltd REgent 2430 | Home Office E. B. Trout J. W. VanRiper SHerwood 2-8262 | Akron, Ohio J. C. Clinefelter JEfferson 3264 | Los Angeles, Cal. H. M. Royal, Inc. LOgan 3261

PATERSON 3, NEW JERSEY

New Officers Elected by Board of Belden Manufacturing Company

CHARLES S. CRAIGMILE has been elected president of **Belden Manufacturing Company,** manufacturers of electrical wires and cables, with plants in Chicago, Illinois and Richmond, Indiana. He succeeds Whipple Jacobs, who resigned to become president of Phelps Dodge Copper Products Corporation, New York, N. Y. Mr. Craigmile was elected at a special meeting of the board on December 30, 1948, following acceptance of Mr. Jacobs' resignation.

★ ★ ★

MR. Craigmile started with the Belden Manufacturing Company in 1915 as an assistant in the coil engineering department. He has been with the company ever since, except during the first World War when he served as first lieutenant of American field artillery in France. In 1939 he was made a member of the Belden board of directors, and he became executive vice president in 1942.

★ ★ ★

AT the same meeting, **Arthur L. Wanner,** treasurer since 1936, was elected vice president and treasurer of the company.

★ ★ ★

E. L. Klinger

Assistant Wire Rope Sales Manager The Colorado Fuel and Iron Corporation

E. L. KLINGLER is now directing the sale of Wickwire rope in the mid-continent area (Houston, Abilene, Texas and Tulsa, Oklahoma).

★ ★ ★

ON February 1st he moved to Houston, from which point he will serve C. F. and I. customers in this district. He previously operated out of Palmer, Massachusetts sales office.

★ ★ ★

MR. KLINGLER has a background of 19 years in the wire rope industry including production, engineering and sales. He previously spent six years in the mid-continent area as a wire rope salesman.

★ ★ ★

Eugene Roth Establishes Own Sales Agency

EUGENE ROTH, formerly with **Vascoloy-Ramet Corporation,** has established a manufacturers' representation agency under the name **Eugene Roth, Inc.,** with offices located at 206 South Broadway, Yonkers, 2, N. Y.

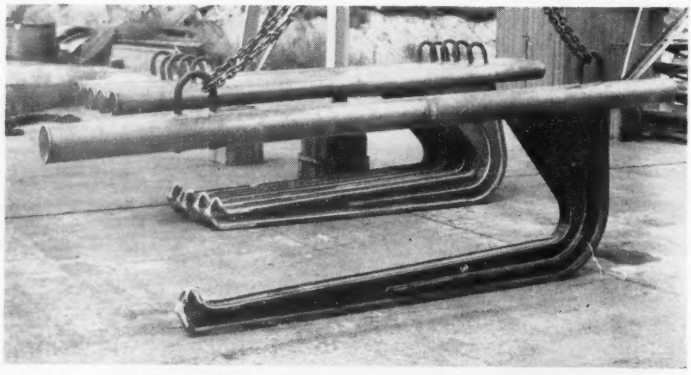
★ ★ ★

THE company is the exclusive representative of the Vascoloy-Ramet Corporation in this area on carbide dies and of the Roux Wire Die Company on diamond dies. They are in a position to represent other concerns who sell to the wire industry.

★ ★ ★

MR. ROTH, one of the pioneers in the carbide die industry in this country, helped to introduce Widia dies, made by Krupp

Hairpins
THAT LIFT TWO TONS



WELDCO lightweight **hairpin hooks cut pickling costs . . . resist corrosion . . . last longer**

These hairpin pickling hooks, recently shipped to a leading Eastern wire mill, measure 14 feet in length, and each can handle 4200 pounds of coiled steel products at a time. Lightweight and unusually strong, the Weldco hooks are made of heavy, corrosion-resistant Monel plate. The spreader bars are of steel tubing, Monel-sheathed for maximum protection against strong pickling acids and fumes, and to keep scale or rust from falling onto the coil being processed.

Many wire mills throughout the country use Weldco hairpin hooks because of their excellent service record. Why not find out how these new, improved high-strength hooks can cut your costs? A phone call or letter will bring you complete information.

THE YOUNGSTOWN WELDING & ENGINEERING COMPANY
3706 OAKWOOD AVE. . . . . YOUNGSTOWN, OHIO

at the time, throughout the United States. When the Krupp rights were bought out by Carboloy Company, he joined that organization and worked there for six years, following which, he went with Vascoloy-Ramet. He is a charter member of the Worcester Chapter of the A.S.I.E., Second Vice President of the New York Chapter of the A.S.I.E., a member of the Wire Association and of the A.M.S.

★ ★ ★

GENE ROTH is widely known throughout the wire industry, and is a familiar figure around Wire Association meetings. His many friends wish him a full measure of success in his new undertaking.

★ ★ ★

Firth-Sterling Appoints New Manager of Sales Promotion and Advertising

APPOINTMENT of **Michael N. W. de Berardinis** as Manager of Sales Promotion and Advertising of **Firth Sterling Steel & Carbide Corporation,** McKeesport, Pa., effective January 3, was recently announced by the company.

★ ★ ★

MR. DE BERARDINIS formerly was with the Sales Promotion and advertising Department of Westinghouse Electric Corporation. Previously, he was a Senior Industrial Engineer with the War Production Board in the Detroit Regional Office and had been associated with the magazine, Automotive News.

★ ★ ★

DURING World War II, he served in the Army Air Force. He is a member of the Engineering Society of Detroit.

★ ★ ★

Chain Belt Opens New Offices

CHAIN BELT COMPANY of Milwaukee has announced the opening of two new District Sales Offices.

★ ★ ★

ONE, in St. Louis, is located at 8001 Clayton Road, St. Louis, Missouri and will be under the direction of **Clarence R. Studer,** District Sales Engineer. Mr. Studer, a graduate of Washington State College, is a Registered Professional Engineer in Missouri for both Electrical and Mechanical Engineering. He has handled the products of Chain Belt Company in the St. Louis area for four years. Earlier experience includes 19 years with General Electric Company as Application and Sales Engineer.

★ ★ ★

THE other, in Jacksonville, located at 340 W. Church Street, will be under the direction of **David B. Hill.** Mr. Hill graduated from Clemson A & M College with a B.S. degree in Mechanical and Electrical Engineering. Since his first employment as a Conveyor Engineer by Ford Motor Company, he has had over 25 years of experience covering design, installation, service and sales in this and closely related fields. He joined Chain Belt Company in 1937.

★ ★ ★

Hydraulically Operated **TRAVERSE REELS**

FOR FLAT WIRE AND NARROW STRIP

• The self-contained, compact SECO Traverse Reel has smooth, powerful hydraulic operation — at speeds from 150 to 600 feet per minute.

PERFECT SPEED CONTROL from zero to top running speed through flow control.

ACCURATE TENSION CONTROL through pressure regulation.

Built in sizes for coils weighing up to 600 lbs., for round or flat wire. Unit shown occupies floor space 24" x 42". Modifications in design and construction to meet specific requirements.

WIRE SPOOLERS

Single and Multiple Type

Speeds Up To 4,000 feet per minute

STEEL EQUIPMENT CO.

SECO 2890 EAST 83rd STREET CLEVELAND 4, OHIO

Dr. John N. Kenyon Appointed

DR. JOHN N. KENYON, well known to the wire industry for his research in spring fatigue, etc., now consulting research engineer and former member of the Columbia University Staff has been appointed visiting lecturer in Metallurgy for the Spring term in the School of Engineering of Princeton University.

* * *

DR. KENYON will appear in forthcoming issues of WIRE & WIRE PRODUCTS on special spring editorials of interest to the entire field.

* * *

Frank C. Jones

FRANK C. JONES, president and general manager of **The Okonite Company,** Passaic, N. J., died on January 21st, 1949.

* * *

MR. JONES served a number of government and national business organizations as advisor on matters pertaining to the electrical industry. He had been president of N.E.M.A. in 1935 and 1936, was a member of the board of the N.A.M., the business advising committee of the U.S. Division of Commerce, the copper industry advising committee and the advisory committee of the War Production Board.

* * *

ALBERT F. METZ, formerly vice-president and treasurer has been elected president and general manager to succeed Mr. Jones. Other changes include the election of **Donald R. Stevens** to the office of executive vice-president and **Stephen A. Wilson** as director.

* * *

IN 1919 he became, after the death of his father, treasurer and general manager of the Okonite Company and was elected president in 1932 of the Okonite Calender Cable Company, Inc., of Paterson N. J.

* * *

David A. Nemser

DAVID A. NEMSER, Metallurgist and head of the New England Technical Section of the Development and Research Division of **The International Nickel Company, Inc.,** died on January 5th, at his home in West Hartford, after an illness of several weeks. He was fifty-one years old.

* * *

BEFORE joining International Nickel in 1934, Mr. Nemser was Chief Metallurgist of the Pratt and Whitney Division, Niles-Bement-Pond, in Hartford. A well known metallurgist, he did consulting work on problems concerning metallurgy and was an expert on the machining characteristics of alloy steels, a subject on which he often lectured before various technical groups. During World War II he was a member of the Industrial Advisory Committee of the War Production and Engineering Counsel for Northern Connecticut.

* * *

The **SPECIALISTS** in
Wire - Straightening and Wire - Cutting!

Diameter Range — 1/16" to .005"

PRECISION - Our Motto

DON'T hesitate to call on us when you are confronted with wire-straightening problems involving close tolerances and absolute accuracy. For seventeen years we have specialized in straightening and cutting all gauges of fine wire, hard or soft, ranging in diameter from one-sixteenth of an inch down to five-thousandths of an inch. We employ gun-barrel accuracy in straightening lengths from one inch to ten feet or any fractional part thereof. Ends cut absolutely clean without burrs.

ASK ABOUT OUR UNEXCELLED FACILITIES FOR CLEANING AND POINTING WIRE ALREADY STRAIGHTENED AND CUT.

ALL TYPES OF WIRE...

- Nickel
- Stainless Steel
- Bronze
- Brass
- Copper
- Alloy Wire
- Music Wire
- Tag Wire
- Florist Wire

Write us today!

Manufacturers of the famous ARMA PAPER CLIP

PITTSBURGH CUT WIRE COMPANY
1112-20 GALVESTON AVENUE · PITTSBURGH, PENNSYLVANIA.
TELEPHONE: CEdar 4702

A Review of Recent Wire Patents

NO. 2,457,883, DETACHABLE WIRE LETTER WITH FABRIC COVERING, patented January 4, 1949 by Ira W. Fuller, Roxbury, Mass.

The skeleton of the letter is composed of boundary and cross wires.

★ ★ ★

NO. 2,458,318, WIRE DISPENSING CONTAINER, patented January 4, 1949 by Miles H. Tuft, Huntington Park, Calif., assignor to Deere Manufacturing Co., a corporation of Iowa.

This device is adapted to house and dispense coiled wire.

★ ★ ★

NO. 2,458,789, WIRE COILING MACHINE PARTICULARLY FOR PRODUCING COILED FILAMENTS FOR ELECTRIC LAMPS AND ELECTRONIC TUBES, patented January 11, 1949 by Hans Marter, Milan, Italy, assignor to Societa Tecnica Applicazioni Metalli Duri Ed Affini—S. T. A. M. A., Milan, Italy, a corporation of Italy.

In this machine there are a hollow mandrel-guide spindle revolvable about its axis, a winding head on the spindle near its discharge end for accommodating the wire to be coiled, a mandrel feeding member near this spindle end and revolvable about an axis extending at an angle to an axial plane of the spindle, this spindle being angularly displaceable about a stationary pivot axis extending parallel to the axis of the feeding member.

★ ★ ★

NO. 2,458,669, SPRING BALANCE, patented January 11, 1949 by Wilfred H. Yeamans, Plainville, Conn.

The greater part of this balance is constructed of coiled or bent wire.

★ ★ ★

NO. 2,459,161, METAL COATING, patented January 18, 1949 by Arch W. Harris, Cleveland, Ohio, and Alfred H. Ward, Pittsburgh, Pa., assignors to The American Steel and Wire Company of New Jersey, a corporation of New Jersey and Carnegie-Illinois Steel Corporation, a corporation of New Jersey.

A ferrous metal coating method is disclosed wetting the metal with a water solution of ammonium chloride, drying the metal so it retains a coating of ammonium chloride, heating it to temperatures ranging from 660° F. to higher temperatures insufficient to melt the metal in an atmosphere containing sufficient hydrogen to make it reducing respecting the formation of iron compounds by the ammonium chloride, and subsequently coating the metal with molten metal such as zinc, tin, aluminum and their alloys.

★ ★ ★

NO. 2,459,507, METHOD OF INDUCTION HEATING CONTINUOUSLY MOVING WIRE, patented January 18, 1949 by Robert H. Denham, Scotia, N. Y., assignor to General Electric Company, a corporation of New York.

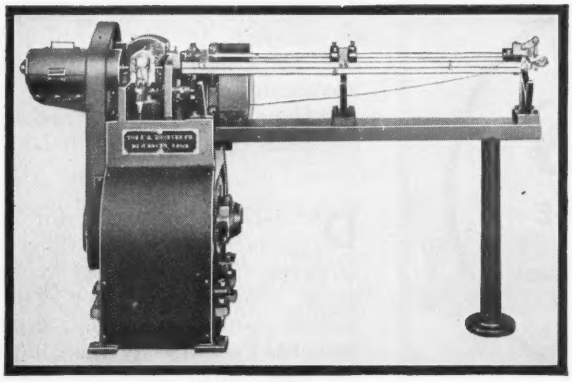
Wire is continuously passed in a loop having two turns at each end in electrically conducting engagement with each other while mantaining the ends of the wire in separated electrically insulating relation with each other thereby to form a loop having two electrically connected turns at opposite ends with a single wire length on one side of the loop and a double wire length on the other side of the loop and then inducing in the loop by magnetic induction a heating current flowing through the single and double wire lengths in series with each other so that heat is generated mainly in the single wire length to heat the wire to a predetermined temperature.

★ ★ ★

NO. 2,459,536, METHOD AND APPARATUS FOR WINDING COILED BODIES, patented January 18, 1949 by Ernst A. Nordberg, Southport, Conn.

Complete Description and Drawings of Patents May Be Had for 50 cents, outside the United States and Canada $1.00. Address, Wire & Wire Products, 300 Main St., Stamford, Conn.

Automatic WIRE STRAIGHTENING and CUTTING MACHINES



SHUSTER WIRE STRAIGHTENER TYPE A
Wire Capacity .025 - 1/16″ Diameter

High speed, direct driven 5-die straightening flier with precision cut-off that assures undistorted, square cut ends. Efficient V-belt motor drive, ball and roller bearings throughout, extremely rigid construction.

Shuster Wire Straighteners are available for wire up to 11/16″ diameter.

Write for catalog.

Prompt Delivery

METTLER MACHINE TOOL, INC., *Shuster Wire Machine Div.,* **132W Lawrence St., New Haven, Conn.**

SHUSTER *Automatic*

Since 1866

WIRE STRAIGHTENING AND CUTTING MACHINES

The method of winding a number of strips in superposed relationship onto a winding arbor, consists in mounting the several strips in the form of supply reels upon superposed axes parallel to the arbor axis, arranging the edges of these reels in predetermined lateral relationships to one another, threading the strip ends into engagement with the arbor, rotating the arbor to draw selected strip lengths from the supply reels to the arbor, and guiding each strip during its entire travel from supply reel to arbor along an arcuate path whose curvature is reverse with respect to the curvature of the strip on its supply reel.

★ ★ ★

NO. 2,459,653, INSULATED CONDUCTOR, patented January 18, 1949 by John J. Keyes, Edgewood, Pa., assignor to Westinghouse Electric Corporation, East Pittsburgh, Pa., a corporation of Pennsylvania.

About the wire conductor is polymerized tetrafluoroethylene, an exterior layer of an inorganic fibrous material applied about the polymerized tetrafluoroethylene, and a silicone resin applied to the fibrous material to impregnate and bond the whole.

★ ★ ★

NO. 2,460,107, APPARATUS FOR TESTING INSULATED WIRE AND CABLE, patented January 25, 1949 by Harry B. Slade, Passaic, N. J., assignor to The Okonite Company, Passaic, N. J., a corporation of New Jersey.

This apparatus comprises a container of liquid dielectric, with a tubular electrode submerged therein, the inside diameter of the tubular electrode being such that it will fit snugly about the surface of the insulation of an insulated cable under test passing through the electrode, a device for maintaining a potential difference between the electrode and the conductor of the cable under test, and an indicating device for detecting the presence of radio frequency currents caused by ionization discharge between the electrode and cable conductor as the cable is passing through the electrode.

★ ★ ★

NO. 2,460,235, WIRE TWISTING APPARATUS, patented January 25, 1949 by James A. Openshaw, Southampton, Mass., assignor to Stanley Home Products, Inc., Westfield, Mass., a corporation of Massachusetts.

More specifically, the apparatus is adapted for clamping end portions of wire for twisting them in a brush-forming operation.

★ ★ ★

New Catalog on Material Handling Equipment

A NEW 18-page catalogue has been announced by the **Fab-Weld Corporation,** 3650 Richmond Street, Philadelphia 34, Pa., describing their complete line of material handling equipment for wire and other product fabrication.

★ ★ ★

THE line is comprised of skids for processing, handling and storing; pallets; trucks; trailers; car bridge plates; hoopers and end dumps and racks. These have been developed out of their own requirements as a result of the handling and fabricating problems of an affiliate, the Atlas Fence Company.

★ ★ ★

THE hundred or so units described are all part of a system designed for the efficient handling of materials, thereby saving handling costs. Most of the units are accessories for and work in conjunction with power trucks or overhead conveyors and hoists.

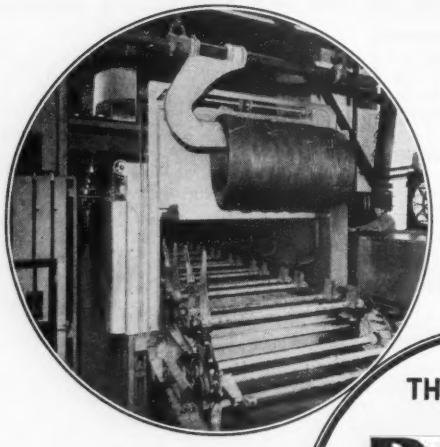
★ ★ ★

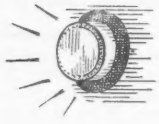
DESIGNED primarily for wire product fabrication they will, however, be found useful in many other lines. The catalog will be mailed upon request to interested persons. Please write the company for your copy.

★ ★ ★

WIRE AND ROD BAKING IS NOW

Completely Automatic





Push Button Control

operates the entire process even to raising and lowering oven doors without manual handling.

From the sizable savings in time and labor along with doubled plant capacity which they provide, the remarkable ROSS Wire and Rod Bakers rapidly offset their entire cost as proven by their performance records in prominent plants.

THE MODERN

ROSS

STRAIGHT LINE

Baker

Consult us on the possibilities for your plant. No obligation.

ROSS SYSTEMS

J. O. ROSS ENGINEERING

CORPORATION

MANUFACTURERS OF AIR PROCESSING SYSTEMS

350 MADISON AVENUE NEW YORK 17, N. Y.

201 N. Wells Street, CHICAGO-6 • 79 Milk Street, BOSTON-9 • 9225 Grand River Avenue, DETROIT-4 • 600 St. Paul Avenue, LOS ANGELES-14

ROSS ENGINEERING OF CANADA, LIMITED, MONTREAL, CANADA • CARRIER-ROSS ENGINEERING COMPANY, LIMITED, LONDON, ENGLAND

SEND IN

YOUR ORDER NOW

for the

1949 WIRE BUYERS' GUIDE

New Facts on Electroplated Nickel Discovered by Research

THE Research Committee of the **American Electroplaters' Society,** at its quarterly meeting held in Rockford, Illinois, on December 10, 1948, reported an outstanding discovery on the porosity of nickel from the Society's currently sponsored researches.

★ ★ ★

THE Research Directing Committee reported that the porosity of electroplated nickel foil varies with the crystal structure of the deposit. Since it has been generally conceded that wrought foils are less porous than similar electrodeposited foils from commercial baths, this discovery may well prove to be the cornerstone for improving the corrosion resistance of nickel electrodeposits. Future researches on this subject will determine if nickel baths operating under commercial conditions can be modified to give a crystal structure with an improved corrosion resistance. **Dr. N. Thon** of Princeton University is conducting work on this project entitled "Nature and Effect of Porosity in Electrodeposits".

★ ★ ★

THE Research Committee is currently conducting researches on eight other fundamental problems in electroplating in a number of leading Universities and at the Bureau of Standards.

★ ★ ★

Diamond Research Laboratory Established

THE Diamond Research Laboratory, the only one of its kind devoted exclusively to investigations on all phases of the diamond and its facilities, is available to all branches of the international diamond industry.

★ ★ ★

CRYSTAL structure and related studies in the fields of synthetic abrasives and powder metallurgy have been studied in many industrial and university laboratories. It is the aim of this new laboratory not only to do original research, but to maintain close cooperation with the work of these private laboratories.

★ ★ ★

BESIDES investigations into uses for diamonds, work is also being done on the recovery of used industrial diamonds.

★ ★ ★

THE Diamond Research Laboratory is sponsored by Industrial Distributors, Ltd., a company recently incorporated to market world requirements in industrial diamonds. Inquiries should be directed to them, Diamond Research Dept., Industrial Diamond Information Bureau, 82/34 Holborn Viaduct, London, E.C.1.

★ ★ ★

Booklet on Rough Grinding

A 48 PAGE handbook entitled "Rough Grinding" has been published by the **Norton Company,** Worcester, 6, Mass., describing the use of Norton wheels for grinding operations in foundries, welding, forge and machine shop.

★ ★ ★

BESIDES covering the question of wheel selection it is a gold mine of practical information on how to perform various jobs and includes a chapter on grinding costs, describing how to arrive at proper costs.

★ ★ ★

NEBUTT CO

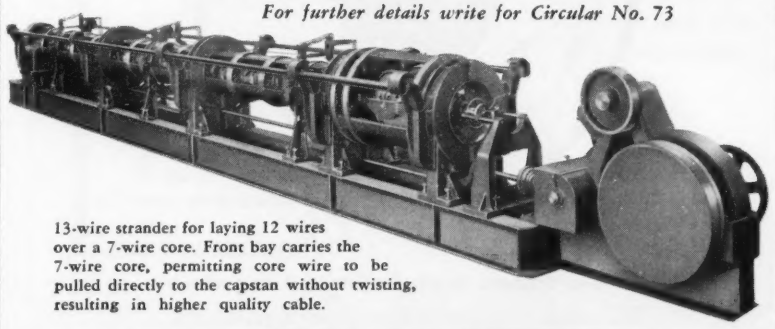
HIGH SPEED

STRANDERS

Fast, dependable producers of copper or steel cables, BUTT Stranders are designed for safe, economical operation. Mounted on a rugged base of heavy I-beams reinforced under all bearing loads, the machine is driven through V-belts, with drive from rotor to back shaft through spur gears operating in an oil bath. Carefully balanced rotors give smooth operation at high speeds. Cradles, also, are counterbalanced to reduce vibration.

The supporting rollers of Textolite operate on replaceable rings rather than directly on tube section. Automatic stopping is provided by powerful electrically operated brakes with current applied to solenoids during the stopping cycle only. No wire angles exceed 35°. In case of wire breakage or spool termination, the machine is automatically stopped. BUTT Stranders are available in Rigid, Planetary and High Speed Types, and in capacities from 7 to 41 reels.

For further details write for Circular No. 73



13-wire strander for laying 12 wires over a 7-wire core. Front bay carries the 7-wire core, permitting core wire to be pulled directly to the capstan without twisting, resulting in higher quality cable.

NEW ENGLAND BUTT COMPANY

Established 1842

304 PEARL STREET • PROVIDENCE 7, R. I., U. S. A.

JAMES DAY (MACHINERY) LTD., "FORD HOUSE", 88 REGENT ST., LONDON, W. 1, ENGLAND

Norton Adds Brickman to Chicago Staff

JOHN N. BRICKMAN, formerly Field Engineer for **Norton Company,** Worcester, Massachusetts, has been appointed Abrasive Engineer in an additional territory recently created in the city of Chicago.

★ ★ ★

New Retail Wire Dispenser

DESCRIBED here is a new, clever and practical development that will put an end to the headache of measuring, cutting and hanking wire and cord sold at retail.

★ ★ ★

THE unit illustrated is a development of **The James L. Entwistle Co.** of Pawtucket, R. I. JLE is a leading manufacturer of wire testing equipments.

★ ★ ★

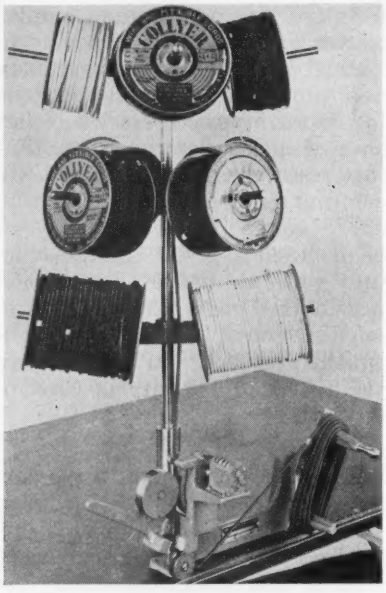
THE JLE wire dispenser was designed and produced as a result of the many complaints that drifted back to JLE through wire manufacturers who in turn heard tales of woe from retailers who had to take valuable time to perform all the tedious operations necessary to sell wire in separate pieces.

★ ★ ★

AS illustrated here, the JLE retail dispenser will hold ten (10) spools of wire or cord in any practical range of sizes, and operates very simply and efficiently.

★ ★ ★

THE wire or cord selected by the customer is placed into position for winding and hanking, and the footage required is wound off and automatically measured in feet. The wire or cord is cut by pressing the hand lever at the lower left. The price can be quickly and easily determined by reading the total on the automatic totalizer and



J. L. Entwistle's new retail wire dispenser.

multiplying the cost per foot of the wire or cord sold.

★ ★ ★

FURTHER, the unit offers an excellent counter display medium for those wire or cord manufacturers who sell their products for individual retail consumption. The JLE wire dispenser itself costs about $65.00 and is available now to wire manufacturers for their own distribution or to hardware, chain stores and other outlets selling wire or cord at retail.

★ ★ ★

FOR complete information, write James L. Entwistle Co., 43 Church Street, Pawtucket, R. I.

All Metal

WIRE SPOOLS

Light weight, all-steel, lithographed.
5", 6½", and 10½" diameter ends.
Ends and traverses may be shipped unassembled.

We also produce spools for fine and magnet wire.

J. L. CLARK MANUFACTURING CO.
600 23rd AVENUE • ROCKFORD, ILLINOIS

Oakite Celebrates 40th Anniversary

FEBRUARY this year holds particular significance for **Oakite Products, Inc.**, pioneers in the field of industrial cleaning materials and methods. It marks the completion of Oakite's fortieth year of cooperation with industry on its production and maintenance cleaning procedures.

★ ★ ★

IT is interesting to note that since its founding in 1909, the Company has steadfastly stressed service over and beyond the mere sale of its products. In support of this policy, it maintains a nationwide field service organization of 180 experienced technical representatives to provide in-plant assistance and to assure the most effective and economical application of its materials by its customers. Striking testimony to the effectiveness of this basic principle is indicated by the fact that, today, the company supplies more than 80 specialized compounds for cleaning and related operations in the metal working field and in many other branches of industry.

★ ★ ★

National Standard Establishes Fellowship at Mellon Institute

THE **National-Standard Company of Niles**, Mich., has established an Industrial Fellowship at **Mellon Institute in Pittsburgh** to investigate in a long-range program major problems related to the technology of fine wire products, such as tire bead wire, strand for heavy duty tire casings, music wire, and aircraft and textile wires. Also to be studied are problems related to flat strip for use in such products as piston rings, razor blades, clock and watch springs, pen points and umbrella ribs. The Fellowship is headed by **Charles H. T. Wilkins**, formerly metallurgist with the Copperweld Steel Company. Mr. Wilkins was graduated at Virginia Military Institute (B.S. in chemistry, 1942) and subsequently has pursued advanced work in metallurgy at the University of Pittsburgh, receiving his M. S. there in 1946.

★ ★ ★

Electric Auto-Lite to Expand

ANNOUNCING an extensive expansion program of the wire and cable production facilities of **The Electric Auto-Lite Company, Royce G. Martin**, President, stated recently that the company's newest wire plant at Hazelton, Pennsylvania, would be in operation by May.

★ ★ ★

LONG a major factor in the production of wire and cable for automotive and industrial use, the company's present plant at Port Huron, Michigan, turns out annually more than a million miles of magnet, lighting and instrument wire, vega chromoxide, steelductor, spark plug wire, battery cables and wiring harness.

★ ★ ★

THE company has for many years provided original equipment for leading American manufacturers in the industrial field as well as for builders of airplane engines, motor boats, cars, trucks and tractors.

★ ★ ★

MR. MARTIN states that the demand for Auto-Lite wire and cable production has increased enormously over recent years and

For Improved Drawing and Longer Die Life

Copper-coat **WIRE, ROD and TUBING** *with*

Cuprodine®

"Cuprodine", in a simple chemical process without current, deposits an adherent layer of copper on both mild and stainless steels. This layer acts as an effective lubricant—reduces wear and scratching of dies; prolongs die life; minimizes scratching on wire, rod and tubing; and increases the number of draws per die.

CHEMICALS ACP PROCESSES

RUST PROOFING AND PAINT BONDING
Granodine *
Duridine *
Allodine *
Lithoform *
Thermoil-Granodine *

RUST REMOVING AND PREVENTING
Deoxidine *
Peroline *

PICKLING ACID INHIBITORS
Rodine * ®

"Cuprotek"® passivates Cuprodized and other cuprous surfaces, and acts as a paint bond, or a good temporary preventive of corrosion.

Write or call Ambler 0486, for further information on both "Cuprodine" and "Cuprotek".

Pioneering Research and Development Since 1914

AMERICAN CHEMICAL PAINT COMPANY

AMBLER, PA.

Manufacturers of Metallurgical, Agricultural and Pharmaceutical Chemicals

that sale of the company's wire production will in the future be in the hands of **Roy Butts,** General Sales Manager of the Wire Division at Port Huron.

★ ★ ★

THE production at the new Hazelton plant will consist largely of the same types of wire products as are now produced at Port Huron with the addition of certain new types currently being requested by customers. Mr. Butts is expanding his sales organization to meet the demands of the new business anticipated.

★ ★ ★

THIS new plant, number twenty-eight in the Auto-Lite coast-to-coast network, was located in Hazelton as a result of a program conducted by the local Chamber of Commerce and supported by the townspeople to bring industry to their city.

★ ★ ★

Black Issues Literature on New Nail Machines

A NEW leaflet, giving specifications on the complete line of BLACK Nail Machines has been issued by **Black Industries,** 1400 E. 222nd St., Cleveland 17, Ohio. The series covers the entire range from brads to spikes and is designed especially for continuous, high speed operation.

★ ★ ★

THIS design, tried and proven in actual production, is the result of many years of experience with wire and nail mill problems. The heavy duty, all steel construction assures decreased maintenance costs, as well as drastically reduced noise and vibration. Special features include pressure lubrication, steel-backed tri-metal crankshaft bearings and a length of feed which is adjustable during operation.

★ ★ ★

THE data sheet will provide sufficient information for one to decide which model will meet his requirements. Prices, deliveries and other details will be furnished upon request.

★ ★ ★

Mill Being Equipped to Roll "Transparent" Steel

A TYPE of rolling mill using a process developed during the war in Germany by the Krupp Works is being installed in a mill at West Leechburg, Pa.

★ ★ ★

THE mill has 20 backup rolls to put pressure on the steel. This mill, called the "Rohn" mill, is somewhat similar to the Sendzimer mill recently put into operation at Washington, Pa. in the Washington Steel Corporation's plant. The new mill is believed to be a later product of the genius who produced the Sendzimer mill and is said to roll steel so thin that one can see through it. The steel is reduced to .0005 inches in thickness. The mill was damaged in the war but was brought to this country by the Government and is to be operated experimentally by Allegheny-Ludlum for the Navy.

★ ★ ★

YOUR COMPLETE CARBIDE
REQUIREMENTS
FROM **ONE** SOURCE

DIES

Large stock of rough cored dies. Rough and Semi-finished mandrel nibs, Heading & Extrusion dies, Knives and Quills, Wear Parts and miscellaneous Carbide items can be furnished promptly to your specifications.

TOOLS

Large representative stock of WENDT-SONIS carbide cutting tools including single point tools, Reamers, Drills, Counterbores, etc.

Quotations Furnished on Request

EASTERN CARBIDE CORP.

909 MAIN STREET NEW ROCHELLE, N. Y.

Telephone: New Rochelle 2-6630

Representatives of Hyprez Diamond Lapping Compounds for Your Die Room Needs.

Eastern Distributors of Wendt-Sonis Carbide Cutting Tools.

COMPLETE CARBIDE SALES & SERVICE

An ADVERTISER likes to know his ads have been read so please mention WIRE & WIRE PRODUCTS when writing him.

INDUSTRIAL DIAMOND ASSOCIATION
OF AMERICA, INC.

STEPHEN W. HOFFMAN, President CHARLES J. KOEBEL, 1st Vice-President WALTER J. MEINHARDT, 2nd Vice-President

Communications:
ATHOS D. LEVERIDGE
Executive Manager
& Secretary-Treasurer
501 LEXINGTON AVENUE
NEW YORK 17, N. Y.
WICKERSHAM 2-1400

Diamond Die Data
I.D.A. Diemakers Committee Meets: Promotes Plans For Standardization

The 4th in a series of letters, addressed to the Wire Drawing Industry.

TO further their concerted movement for a still better understanding between diamond die producers and the wire manufacturers who use their product, the Diemakers Committee of the Industrial Diamond Association of America, Inc. met on January 14th, at the Penn-Alto Hotel, Altoona, Pennsylvania.

★ ★ ★

PRESENT were the managers of the following firms:

Ajax Industrial Supplies, Inc., Fort Wayne, Ind.
Cochaud Wire Die Corp., New York, N. Y.
Detroit Wire Die Co., Fort Wayne, Ind.
Fort Wayne Wire Die, Inc., Fort Wayne, Ind.
Indiana Wire Die Co., Fort Wayne, Ind.
Luginbill Wire Die Co., Fort Wayne, Ind.
Wayne Wire Die Co., Hillside, New Jersey.

★ ★ ★

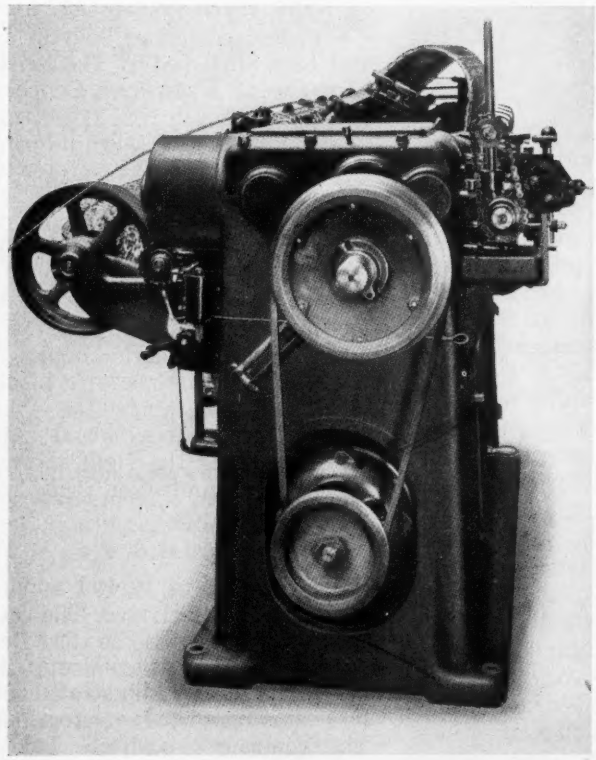
ALSO represented members were Roux Wire Die Co., Oriskany, N. Y., and Balloffet Dies & Nozzle Co., Guttenberg, N. J.

★ ★ ★

THE few important producers of diamond dies who are not members of the Association were invited and one of them, Mr. L. Zucker of Union Wire Die Co., New York, N. Y. participated in the proceedings. Executive Manager, A. D. Leveridge of the I. D. A., acted as Secretary.

★ ★ ★

THE Committee considered the next step in obtaining minimum standards for diamond die size and quality, for uniform inspection methods and standard sizes for diamond mountings. They discussed research to maintain diamond die superiority and a continuation of the public relations which had been so successfully advanced since last Spring, with the cooperation of the Wire Association, that scores of wire manufacturers were now in contact with I. D. A. for information.



ENORMOUS PRODUCTION ON CHAIN LINK FENCING

BLASHILL MACHINES

are incomparably superior in output, in economy of Factory space, and in low costs for labor, power and maintenance.

30% TO 50% HIGHER PRODUCTION.

Thoroughly modern in design. All bearings "Ball" or "Roller". Accurate and positive automatic controls.

Fifty years' experience in Fence Machines and Fence are behind them. Tell us your needs for fence production.

ARTHUR BLASHILL

WOODSTOCK,
ONTARIO, CANADA

(Formerly at Birmingham, England)

LET

STANNOCHLOR

or

STANNOUS SULPHATE

solve your tinning problems

One of these two M & T chemicals will meet all your liquor finishing or immersion plating requirements . . . whether for acid or alkaline . . . white or bronze finish baths.

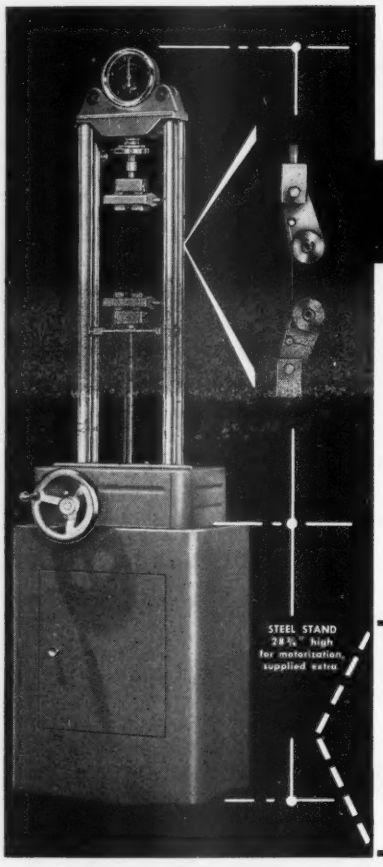
STANNOCHLOR and STANNOUS SULPHATE are stable . . . will not deteriorate with age in summer or in winter. Their use makes it possible to keep a stock on hand at all times . . . permits purchasing in large quantities for economy.

And, because they contain no water of crystallization, STANNOCHLOR and STANNOUS SULPHATE go further pound for pound.

Write for more complete information.

METAL & THERMIT CORPORATION

120 Broadway • New York 5, N.Y.



CHECK WIRE SCIENTIFICALLY WITH AN ACCURATE DILLON TESTER

Handles solid or stranded materials. Easy to operate. Quickly pays for itself.

DILLON

Model "L" Universal Tester

● It isn't necessary to depend upon outside testing sources when you own a reliable DILLON instrument. Specimens can be checked right on the spot the moment a problem arises. Anyone can operate without training or knowledge.

DILLON testers are available in 7 different ranges: Lowest reads from 0-250 lbs. Highest reads from 0-10,000 lbs. Hand operation is standard—motorization optional. Extra *tall* models can be supplied if materials have considerable elongation. Shipment of ANY capacity in only 8 days.

● *NEW bulletin just off the press describes Model "L" with pictures, dimensions, prices. Use coupon below for your copy. No obligation!*

W. C. Dillon & Co., Inc.
5410-WW W. Harrison St., Chicago 44, Ill.

Please send at once, New Bulletin on Dillon Model "L" Tester.

Company_____

Name_____ Title_____

Address_____

City_____ Zone_____ State_____

THE diemakers recognized that quality was so important it was useless to prescribe minimum sizes while specifications for quality were not, at this time, practical from an enforcement standpoint. But the Committee felt it wise to recommend the adoption of standard size specifications along with the other factors. After correction, the minimum size specifications on a tentative draft prepared by the National Bureau of Standards, after the Meeting of September 1948 at I.D.A. Headquarters, was recommended to I.D.A.'s Board of Directors as in order for Standardization. But it provided that prior to submission to the Government, outstanding wire manufacturers, consumers of diamond dies, should be consulted on the specifications of the proposed Standards. It was well understood that most of the producers and consuming manufacturers in any industry are consulted by the Government prior to final establishment and promulgation of Standard specifications.

★ ★ ★

Bristol Publishes New Catalog

A NEW thermocouple and pyrometer accessories bulletin has just been published by **The Bristol Company** of Waterbury, Connecticut. This bulletin, No. P1238, contains 56 pages of detailed information on thermocouples, protection tubes, and other pyrometer accessories. A technical section, described as the "Users' Manual", contains engineering handbook data on such subject as factors affecting thermocouple life, corrosion and poisoning, thermocouple reproducibility, thermocouple insulation, and the things the every user of pyrometers should know about selecting the right thermocouple and protection tube for every application.

★ ★ ★

A NUMBER of typical applications are illustrated. The catalog section, described as the "Buyers' Guide", is conveniently indexed and liberally illustrated with line drawings and photographs. The company's complete line of thermocouples, thermocouple wire,

protection tubes, insulators, extension wire, and accessories is listed in an easy-to-use manner. Tables of calibration data for the commonly-used base-metal and rare-metal thermocouples is included in the bulletin. Copies of Bulletin P1238 are now available from The Bristol Company, Waterbury 91 Conn.

★ ★ ★

New Forming Brake Brought Out

IN response to requests from customers for a forming machine that would handle low ductility metals, **O'Neil-Irwin Mfg. Co.**, 303 Eighth Avenue, Lake City, Minn., has brought out the new "Di-Acro" Radius Brake No. 4, a 24" precision machine capable of forming duraluminum, chrome

O'Neil-Irvin "Di-Arco" Radius Brake No. 4

molybdenum, spring tempered alloys and other metals.

★ ★ ★

THE new radius brake eliminates the possibility of fracture developing at the forming line and is also useful in forming ductile materials where radius bends are desired and besides its radius forming function, it will also form sharp "no radius" bends performed on earlier standard models.

★ ★ ★

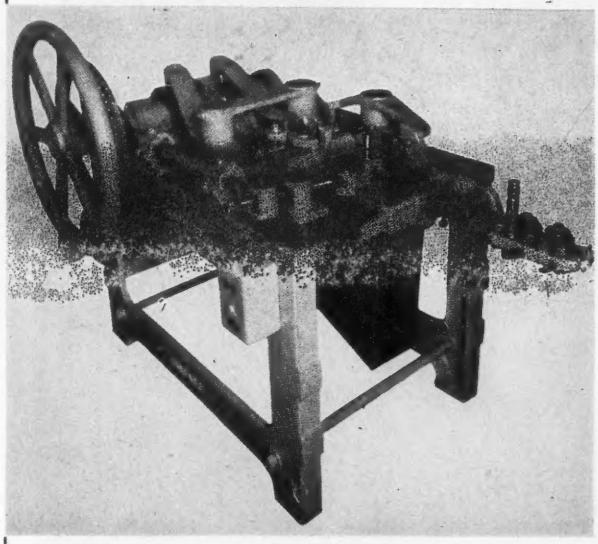
IT is an extremely flexible unit, built of the finest materials, adapted to a wide range of laboratory, experimental and fabricating work. It will handle stock 24" wide and 16 gage in thickness.

★ ★ ★

COMPLETE information is contained in a new catalog describing the entire line. This will be sent on request to persons interested.

★ ★ ★

PROMPT DELIVERIES ON
"ENCO"
WIRE NAIL MACHINES



Easy To Set Up And Operate.

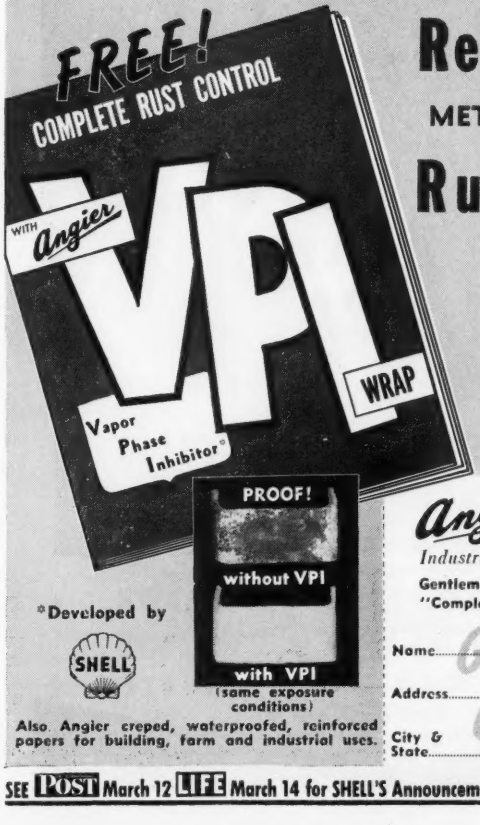
Furnished belt drive or with motor including V belts, starter, etc.

No. 2 size will cut 180 lbs. per hour of 8d common or 12 kegs per 8 hr. day running 300 R.P.M.

Write for prices, stating size and number of machines wanted.

EASTERN NAIL COMPANY
50 ALEPPO STREET • PROVIDENCE 9, R. I.

New 12 Page Booklet Gives All the Facts . . .



Revolutionary
METHOD OF COMPLETE
Rust Control

- Outperforms other methods!
- Eliminates slushing in oil!
- Clean — simple to use!
- Angier VPI even answers rust problems never before solved!
- COSTS LESS in time and materials, as it prevents rust!

*Developed by SHELL

Also Angier creped, waterproofed, reinforced papers for building, farm and industrial uses.

Angier CORPORATION
FRAMINGHAM 3, MASS.
Industrial Packaging Engineers Since 1895

Gentlemen: Please send FREE 12 page booklet, "Complete Rust Control with Angier VPI Wrap".

Name..... Get Your
Address.....
City & State..... Copy Now!

SEE POST March 12 LIFE March 14 for SHELL'S Announcement of VPI-"Invisible Vapor Prevents Rust"

EXTRUDERS BY
OFFER
Control
mpm
MPM offers six-zone control of electrically heated cylinders with nine-eleven or fifteen separate cooling zones for removal of frictional heat or for fast cooling. Higher temperatures—higher screw speeds—higher production—per machine.
Flexibility
These MODERN machines are furnished electrically heated but can be heated or cooled by steam, oil, water, etc. Interchangeable heads and dies to produce covered wire, tubing, rods, strips, wide sheeting are also available along with conveyors, granulators, dryers, etc.
Leadership!
Modern engineering and specialization has resulted in the installation of these machines with 18 of a possible 20 leading material suppliers during the past two years. More complete cooperation with foreign customers too has made MPM the largest exporters of Extruding equipment during the same period.
modern plastic machinery corp.
mpm
GREATER Flexibility = MORE PROFITS!
SEND FOR BROCHURE
15 UNION ST., LODI, N. J.
CABLE ADDRESS
MODPLASEX

PERMAG
COMPOUNDS
—the WIRE DRAWING LUBRICANT that saves your dies!
PERMAG Drawing Compounds are doing a top-notch job in wire mills. Here is why—
PERMAG . . . brings the wire out clean and bright.
PERMAG gives longer life to dies . . . and thus helps to increase production.
Our trained Technicians will be glad to talk with you on wire drawing lubricants. Write or 'phone. No obligation involved.
MAGNUSON PRODUCTS CORPORATION
Mfrs. of Specialized Cleaning Compounds for Industry
50 COURT STREET
BROOKLYN 2, N. Y.
In Canada: Canadian PERMAG Products, Ltd., Montreal
PERMAG

Development in Drawing Stainless Steel

THE MAGNUS CHEMICAL CO., INC., Garwood, N. J. announces an important development in wire drawing. According to **Mr. Harold Trembicki,** Manager of the Metal Coating Division, the development is an entirely new technique in drawing stainless steel wire.

★ ★ ★

HERETOFORE, stainless steel could be drawn successfully only with the use of lead coating. This is a costly, laborious method, but was the only practical way of doing the job.

★ ★ ★

NOW, with Mr. Trembicki's new technique, it is possible to draw stainless steel, continuously, from No. 5 rod down to the finest sizes, without lead, and at a production cost no higher than that for carbon wire. In addition, a bright, satin-smooth finish is obtained. It is expected that this new method of drawing stainless steel will contribute greatly to increase production and lower prices of this highly important metal.

★ ★ ★

COMPLETE information can be obtained by writing to Wire & Wire Products, 300 Main St., Stamford, Conn.

★ ★ ★

Labor Relations

(*Continued from page* 253)

unions will bring little fire to conference tables this year.

★ ★ ★

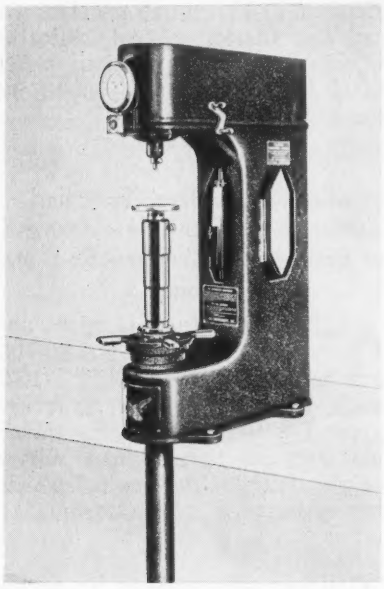
THEY will put up considerable show in their demands for insurance, shorter work weeks and the guaranteed wage. But they will be inclined to settle for nearly any concession.

★ ★ ★

ON the other hand the very facts of unemployment and shorter work weeks will create an unrest in the rank and file which will keep labor leaders from conceding very much. If management demands too much, a wave of strikes might be set off. Many of the country's greatest strikes have come at the turning point when a period of recession was being entered.

New Hardness Tester Announced

A NEW and improved "Rockwell" Hardness Tester offering an ease and simplicity of servicing never before available in this field is announced by **Clark Instrument, Inc.,** Dearborn, Mich. Identified as Clark Hardness Tester Model C-8A, C-12A, and C-16A, the new instrument features a spindle housing and beam assembly that may be replaced by the owner himself without requiring special skill or special tools. As a result of this



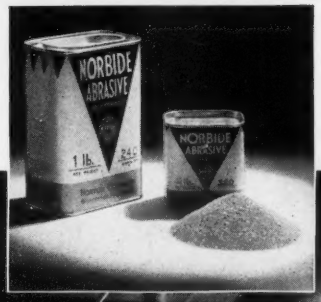
"Rockwell" Hardness Tester, Clark Instrument, Inc., Dearborn, Mich.

improvement, owners of the new Clark Hardness Tester anywhere in the world will be able to renew or recondition their instruments simply by ordering a new spindle housing and beam assembly from the factory and installing it in place of the old.

★ ★ ★

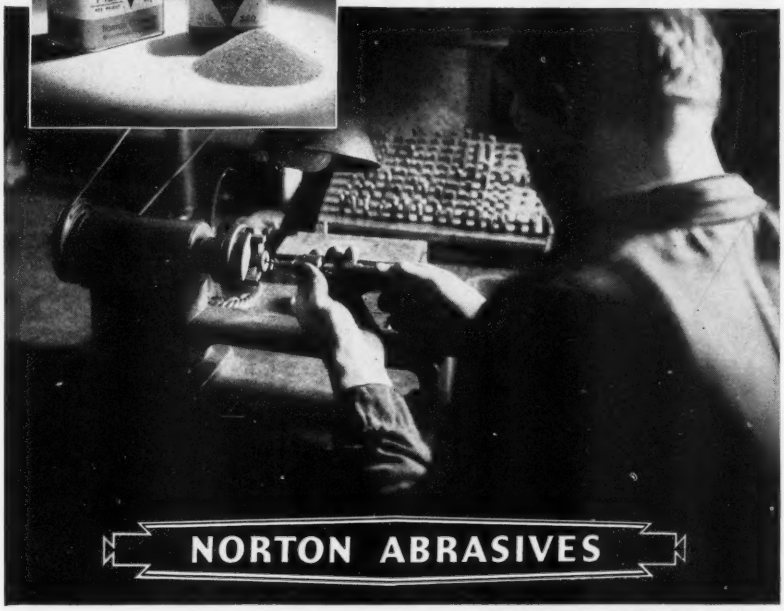
OTHER advantages claimed for Clark Hardness Testers include a frictionless spindle, more positive tripping, and exceptionally lightweight. The body of the tester is cast in aluminum, and weighs from 65 to 85 pounds less than similar units made from steel or cast iron. The frictionless spindle is an exclusive Clark feature that assures a correct minor load every time, according to the manufacturer.

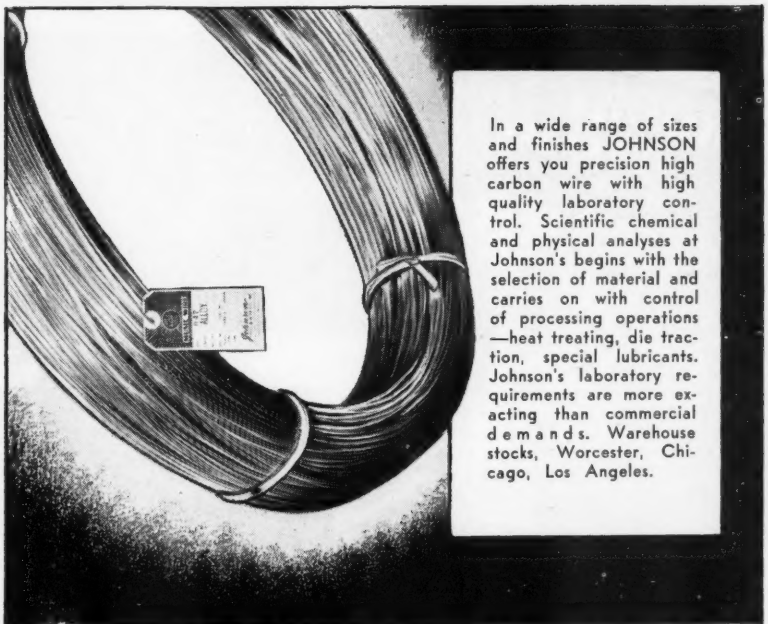
NORBIDE Abrasive: Effective, Economical



This abrasive—second only to the diamond in hardness and 150 times less expensive—does an efficient job of cutting and semi-finishing cemented carbide wire drawing dies.

NORTON CO. — Worcester 6, Mass.





In a wide range of sizes and finishes JOHNSON offers you precision high carbon wire with high quality laboratory control. Scientific chemical and physical analyses at Johnson's begins with the selection of material and carries on with control of processing operations —heat treating, die traction, special lubricants. Johnson's laboratory requirements are more exacting than commercial demands. Warehouse stocks, Worcester, Chicago, Los Angeles.

JOHNSON

STEEL AND WIRE COMPANY, INC.

WORCESTER 1, MASS.

NEW YORK PHILADELPHIA CLEVELAND DETROIT AKRON CHICAGO
ATLANTA HOUSTON TULSA LOS ANGELES TORONTO

If it's twisted folded pressed crushed shaped braided woven paper

TWITCHELL makes it

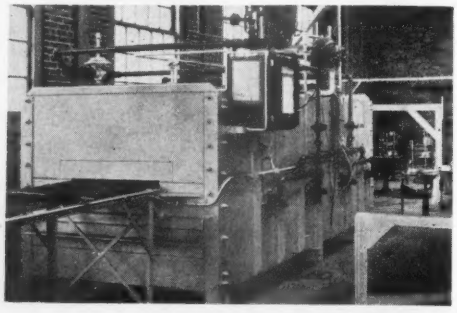
treated braiding and wrapping yarns wound single or multiple ends parallel for new high-speed Abbosealed process or standard braiding equipment.

treated wire-rope cores

waxed cable-fillers for 2- and 3-wire non-metallic sheathed cable and shipboard cable, etc.

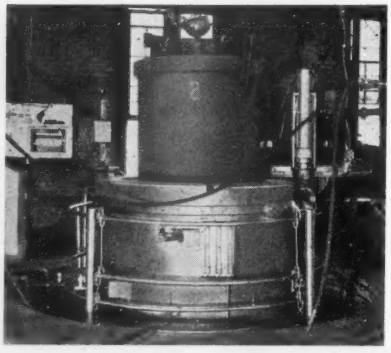
E. W. TWITCHELL INC.
Third & Somerset Streets
Philadelphia 33, Pa.

ROCKWELL FURNACES
Oil • Gas • Electric



Upper—Continuous muffle tube furnace for bright annealing steel, stainless steel and non-ferrous wire in protective atmosphere.
Lower—Pot type furnace for batch bright annealing 5000 lbs. of brass or copper wire in controlled atmosphere.
Rockwell builds bar, billet and rod heating furnaces, batch and continuous furnaces for all wire mill heating processes, and ovens for lime baking and finishes.

Other Rockwell Products
Coil winding machines, reels and spools; pickling, brushing, cleaning, washing, finishing, drying and handling equipment; special fabrications.
We also design non-ferrous rod mills.
Write for Bulletins.



ROCKWELL SINCE 1888 BUILT
FURNACES • OVENS • SPECIAL MACHINERY
W. S. ROCKWELL COMPANY
242 ELIOT STREET • FAIRFIELD, CONN.
In Canada: Francis Hankin & Co., Ltd. Montreal & Toronto

The positive tripping feature is said to overcome the danger of an incorrect major load being caused by friction or drag of the tripping lever on the loading beam.

★ ★ ★

THE Clark Hardness Tester is used for "Rockwell" testing of hard or soft steel, brass, aluminum, cast iron, copper, other metals, alloys, and plastics. The company also makes a Superficial Tester for use where only very shallow indentations may be made. Other Clark products and testing instruments include test blocks, diamond and steel ball penetrators, and the Clarkator Dial Indicator Checker. For information, write Clark Instrument, Inc., 10200 Ford Road, Dearborn, Mich.

★ ★ ★

Mirror-Reflective (Specular) Surfaces on Centerless Ground or Embossed Aluminum Rod and Tubing

ALUMINUM tubing, pipe and round rod of machinable grades (61ST, 17ST, 24ST, 11ST, etc.) that have been centerless ground with suitable grit (about No. 500) can now be made mirror bright, without mechanical polishing or buffing.

★ ★ ★

THIS is accomplished by chemical-polishing (non-electrolytic) by means of a dip for a few seconds into a specially formulated acid solution.

★ ★ ★

CENTERLESS-ground aluminum which has been treated by chemical-polishing is further enhanced as follows:

(1) Its surfaces are passivated.
(2) When subsequently anodized, the surfaces remain bright.
(3) When subsequently anodized and colored (as with organic dyes) beautiful reflective colors are possible. No lacquers, waxes or after-buffing is required.
(4) Striking resemblances to polished and buffed gold, silver, copper, brass, bronze, nickel, chromium, platinum, rhodium and other metals and alloys can be achieved. No lacquers, waxes or after buffing are required.
(5) When subsequently chemically (non-electrolytic) oxidized bright and protected natural aluminum surfaces result. No lacquers, waxes or after-buffing are required.

★ ★ ★

ALUMINUM tubing, pipe and rod can be chemically-polished prior to fabrication or machining, but it is preferable to perform this treatment after machining operations.

★ ★ ★

Chemical-polishing can be set up in manufacturers' and fabricators' plants. Costs of chemical polishing are less than mechanical polishing and buffing. Volume per hour is only limited by the size of tanks.

★ ★ ★

FABRICATORS are invited to submit specimens of their work, which will be chemically polished, or chemically polished and anodized or chemically polished, anodized and colored, in accordance with their specifications, at no cost. Write to **Technical Processes Division** of Colonial Alloys Company, Philadelphia 29, Pa.

★ ★ ★

Special Non-Corrosive Ersin Flux Available in Liquid Form

BECAUSE of its success in the electronics industry, the makers of Ersin Multicore Solder have made ERSIN FLUX, the original activated non-corrosive rosin flux available in a liquid form.

★ ★ ★

ERSIN FLUX, an exclusive product of **Multicore Solders, Ltd.,** is a high grade homogenously activated water white rosin. It has a vigorous fluxing action but does not affect the non-corrosive features of the original rosin. Soldered joints made with the new ERSIN FLUX will not corrode even after prolonged exposure to humidity.

★ ★ ★

THE new liquid ERSIN FLUX leaves nothing but pure rosin on the work after soldering. There are no objectionable odors, it is non-toxic, and may be used whereever plain rosin is specified.

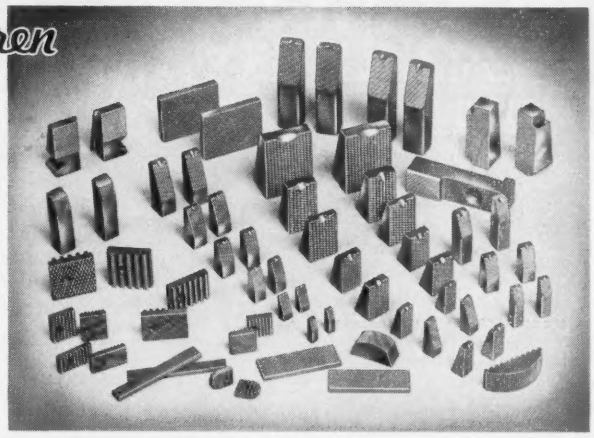
★ ★ ★

FOR further details, write to British Industries Corporation, 315 Broadway, New York City.

★ ★ ★

Sjogren

JAWS.... for Wedge Grips, Pullers and Tensile Testing Machines of all makes are available either from stock or manufactured to order. A Sjogren jaw, made to meet your requirements, guarantees you service.



SINCE S&S 1927

Used by Wire Men Who Want the Best!

SJOGREN TOOL AND MACHINE CO., INC.

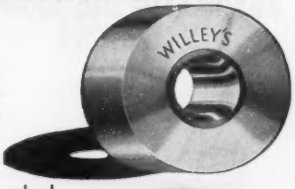
WIRE PULLERS • WEDGE GRIPS • JAWS FOR ALL MAKES OF PULLERS AND TESTING MACHINES • CAGE ROLLERS • SWAGING HAMMERS • POINTING DIES • WIRE SPOOLERS

14 SWORD STREET
AUBURN
MASSACHUSETTS

WILLEY'S DIES LAST MUCH LONGER

SPECIFY WILLEY'S SIZING, EXTRUSION and WIRE DRAWING DIES

Pioneers in the manufacture of wire forming dies, Willey's is in position to make dies to your specifications that give superior performance, cut production costs and hold tolerances for long runs.



There are standard one-piece round dies, available from stock in many sizes — as well as four classifications from blank and rough cored nibs to finished dies, ready to use.

WRITE FOR CATALOG

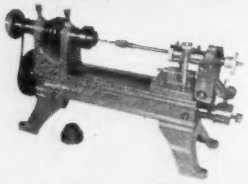
Full information on all sizes and classifications, as well as hundreds of Willey's Tools for other uses.

WILLEY'S CARBIDE TOOL CO.
SOLE MAKERS OF WILLEY'S METAL
1342 W. Vernor Highway Detroit 1, Michigan

NEW **ROOS**

DIE ROOM EQUIPMENT

SEMI-AUTOMATIC POLISHER



MODEL OT - PATENT REGISTERED AND APPLIED FOR

Note these outstanding features for greater accuracy in polishing dies and for prolonged machine life!

(a) Quick opening spindle
(b) Pressure adjustor
(c) New cam assembly
(d) New style leather belt

NEW STYLE TAILSTOCK

To Fit Other Model

ROOS Polisher Model OT

NEW

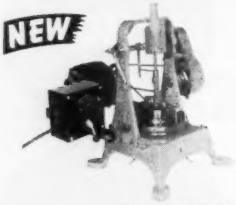
MODEL OT

You can quickly and easily replace the tailstock on your old Roos Semi-Automatic Polisher with the New Model OT-Tailstock. Quotation on this new Tailstock furnished on request.

ROOS

AUTOMATIC DIE SHAPING MACHINE

NEW



MODEL DS-3A

Offers you three improved features: a die rotating attachment; a time switch; and a reversing switch—which provide these advantages:

1. Die rotating attachment and time switch eliminate the formerly necessary constant attention by operator. Rotation of die is automatic, and machine shuts off automatically at end of time cycle.
2. Reversing switch permits rotation of the die in either direction.

Write today for full information!

ROOS TOOL

& MFG. COMPANY

17-19 Grove Street
Montclair, New Jersey

Steel for the West

(*Continued from page* 249)

finishing, but in producing facilities. The U. S. Steel Corporation nationally is spending much over a half a billion dollars on an expansion and rehabilitation program which is now well on its way. On the other side of the picture, however, we are also facing an additional drain from our production which must come ahead of all other demands. I refer to the many allocation programs that are now shaping up and for which the industry must provide a great deal of tonnage. Of prime importance are the military requirements which are certain to take an increasing share of steel production and may take up to 10% of the production of the entire country. In addition, there is the Freight Car Program which has been in force for some time, the Atomic Energy Project and the War Air Heating Equipment Program which are all receiving tonnage out of current production. This appears to be only the beginning, however, since programs for Tank and Oil Field Production Equipment, Inland Waterway Barges, Factory Made Steel Houses and Anthracite Coal Mining have already been allocated. In addition the Iron and Steel Division of the Office of Industry Cooperation in the Department of Commerce has been asked to consider steel requirements for twelve more programs.

★ ★ ★

TO sum up, the programs now accepted amount to over 6 million tons annually, which is almost 10% of our national production. Other programs under consideration might total another 2 million tons. Thus in spite of the expansion in productive capacity the demands seem likely to make the shortage even more acute than it is today.

★ ★ ★

IN discussing the steel problem, I have talked almost entirely of the national picture. However, our industry is such that the Western situation is not much dif-

Harper

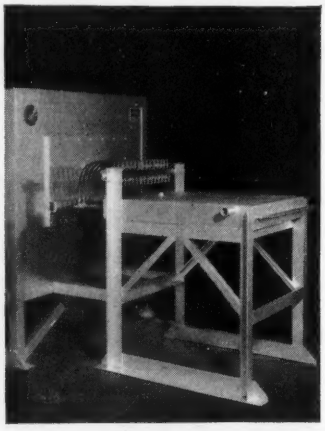
Electric Furnaces

for

BRIGHT ANNEALING

STAINLESS

STEEL WIRE



The above photograph pictures a Harper Furnace specially designed for the continuous bright annealing of 30 strands of steel wire.

The manifold shown distributes hydrogen to 30 tubes which extend through the furnace and through the water-cooled chamber. This furnace is typical of many standard furnaces designed and built by Harper Engineers for the metal working industries.

We will be glad to send you literature on our standard furnaces or work with you on special designs to meet your exact requirements.

HARPER

ELECTRIC FURNACE CORP.

1444 Buffalo Avenue, Niagara Falls, N. Y.

Representatives in all principal cities.

ferent than the national one except that the rapid growth in the West accentuates the difficulties. All over the country steel products are under allocation to industries and customers. In making such allocations we frankly look at both past experience and future prospects. If we based our allocations solely on history, the growth of the industrial West would be stopped. We try to take care of our old and loyal friends, we must also look at the developing needs in the area and foster, insofar as we can, the development of new enterprises which will provide the additional payrolls and steel demand of the future.

★ ★ ★

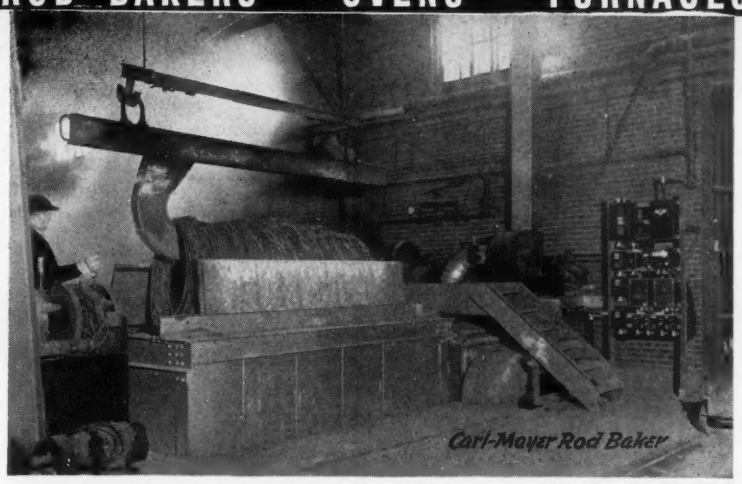
INSOFAR as Western production of steel is concerned, I think you all know that story. The postwar Western steel industry, including Geneva and Fontana and the new Cold Reduction mill at Pittsburg, bears no resemblance to what we had here prewar. Ingot capacity in the Seven Western States is three and one half times what it was in 1940, and it's all running at capacity. Western steel makers are now producing a much larger proportion of the steel consumed in the West than they did prewar. In pipe specifically there has been installed at Fontana the Pacific Coast's first butt-weld pipe facilities with a capacity of 125,000 tons annually. I understand these are now in full production. For larger diameter pipe, the facilities of Consolidated Western Steel Corporation have been expanded substantially and these facilities are contributing heavily to the production of transmission lines at the present time.

★ ★ ★

IN addition to these Western developments, another U. S. Steel Subsidiary, the National Tube Company, has embarked on an expansion program amounting to over 100 million dollars to increase the production of tubular products, and the West will benefit from a share of this increase. This program is already well on its way to completion.

★ ★ ★

MORE PRODUCTION
with CARL-MAYER HI-SPEED
ROD BAKERS - OVENS - FURNACES



Patented
TYPICAL HI-SPEED ROD BAKER — DIRECT OR INDIRECT HEAT — ANY FUEL
WRITE for BULLETIN No. 241
Growing interest in our type of equipment is evidenced by Carl-Mayer installations for such plants as:—

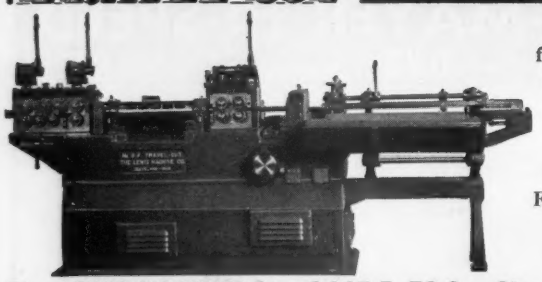
American Steel & Wire Co.
Atlantic Wire Co.
Atlas Steel Co.
Atlas Tack Corp.
California Wire Cloth Corp.
Eaton Mfg. Co.
Frost Steel & Wire Co. Ltd.
Hollup Corp.
Johnson & Nephew Ltd.
Jones & Laughlin Steel Corp.
Pittsburgh Tool Steel Wire Co.
Republic Steel Corp.
Steel Co. of Canada
Wickwire Spencer Steel Div.
Page Steel & Wire Co.

THE CARL-MAYER CORPORATION
3030 EUCLID AVENUE
CLEVELAND, OHIO

REELS SPOOLS
ALL SIZES
WOOD- PLYWOOD -WOOD-METAL
RETURNABLE NON-RETURNABLE
Samples and Prices on Request
DURKEE MFG. CO. PINE RIVER, MINN.

HOWSAM SPOOL COMPANY
500 RATHBONE AVE AURORA ILLINOIS
Phone 2-3043

LEWIS TRAVEL-CUT WIRE STRAIGHTENING and CUTTING Machines



Machines for 1/16" to 3/4" rod
Round
Square
Flat
Hexagon
Ferrous and Non-Ferrous

Automatic
High Speed
Heavy Duty

LEWIS

The LEWIS MACHINE Co., 3445 E. 76 St., Cleveland, O.

WE BUY WE SELL

We Pay Highest Prices for Used Machinery

FOR SALE

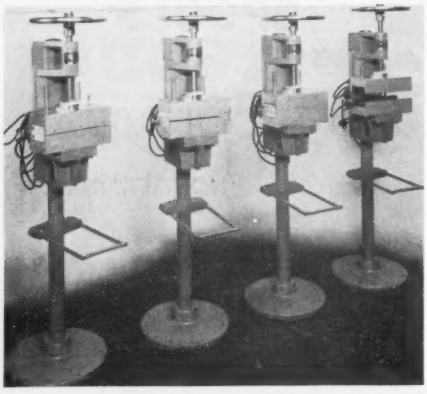
2 ENTWISTLE REWIND STANDS
Complete with automatic predetermined length counter, spark box and controls.

TAPING HEADS - all types
WARDWELL BRAIDERS
TAKE-UP STANDS - all sizes

All Machines Reconditioned in Our Own Shop

WIRE & TEXTILE MACHINERY INC.
P. O. BOX 436, PAWTUCKET, R. I.

ELECTRIC HEATED VULCANIZERS FOR PATCHING RUBBER COVERED WIRE



Write for Details.

We also build a complete line of Wire Enameling and Wire Insulation Winding Machines.

EST. 1853 AIMco INC. 1913
"American" INSULATING MACHINERY COMPANY

517 West Huntingdon St.
Zone 33
Philadelphia, Pa.

STEEL WIRE
by MAURICE BONZEL
Translated and Published by
KENNETH B. LEWIS
Consulting Engineer
Price $15.00 — 495 pages — 414 illustrations
Send Orders to
WIRE and WIRE PRODUCTS
300 Main Street Stamford, Conn.

IN this connection I would like to comment on the recent shift of the industry to a system of naming prices at the mill. This is a radical change for producers and consumers alike and was undertaken only because the Supreme Court decision in the Cement Case left us no choice. It is too early to say exactly what impact this change will have on the steel supply of the West Coast.

★ ★ ★

AS you know, some of the tonnage produced in the West is being used in the construction of oil pipe lines over seas. Many have wondered why so much tonnage was devoted to that purpose. In answer let me recall for you the forecasts of our economists and business leaders right after the war. Almost without exception, they expected and predicted declining business activity—recession. At that time we were faced with marketing 500,000 to 600,000 tons of plates annually from the newly purchased Geneva steel plant in a market in which we had never before, in peacetime, been able to sell more than one fifth of that amount. We knew that the mill could not be diversified for several years and in the meantime we were casting about for markets that would enable us to maintain operations at an economical level. In a plant as large as that one, the use of equipment and crews at only a fraction of their capacity is costly and unsatisfactory. It was our considered judgment that the establishment of a suitable backlog of plate business was a necessity if the plant was to operate at all.

★ ★ ★

IT is not surprising, therefore, that commitments were willingly accepted for these foreign lines, particularly when no one in your industry or any other was willing to forecast the domestic demand which ultimately developed. Furthermore, we must not forget that these same foreign pipe lines had the encouragement and permission of interested departments of the United States Government on the basis that they were important to the role our country had assumed in world affairs.

★ ★ ★

PARALAN

The Lanolin Rust Preventive. Time Tested and Proven for

WIRE and STRIP STEEL

Write us for information

AMERICAN LANOLIN CORPORATION
Lawrence, Massachusetts

Warehouses:
Lawrence, Mass.
Cleveland, Ohio

ONE cannot study the present industrial picture on the Pacific Coast without being impressed by the size of the job that lies ahead. In your industry and in ours, in almost every industry, expanded facilities and expanded production are planned. In many industries steel is one of the vital materials in this expansion and each industry is naturally pressing for all it can get. But we all know that the economy of this country is so inter-related that one industry cannot outstrip all others; rather we must all move forward together. So in the allocation of steel our industry feels a heavy responsibility toward your industry and all others to see that distribution is equitable. We are very conscious of that responsibility which, whether we like it or not, our free enterprise system has placed upon our shoulders. Let me assure you that we will continue to try to discharge that responsibility as you would want us to, with due consideration to the good of each and to the welfare of the economy as a whole.

★ ★ ★

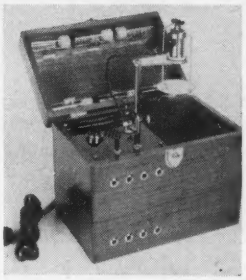
Photoswitch General Purpose Photoelectric Control

PHOTOSWITCH INCORPORATED has introduced Type 20-DJ1 Photoelectric Control for general industrial and machinery application. It provides precise, automatic control for hundreds of specialized industrial processes and is particularly efficient in counting, conveyor control, short-range signal systems, motor or valve control, production inspection, machinery safeguards, and stop-motion control in the Textile, paper and wire industries. It is standard for safety alarms and door operator service.

★ ★ ★

BECAUSE of design features, this control is adaptable where space is limited. The phototube which must be located where the operations are to be controlled, is available either integral with the housing or in a small separate housing as shown by the description. A tamper-proof sensitivity

METALLURGISTS

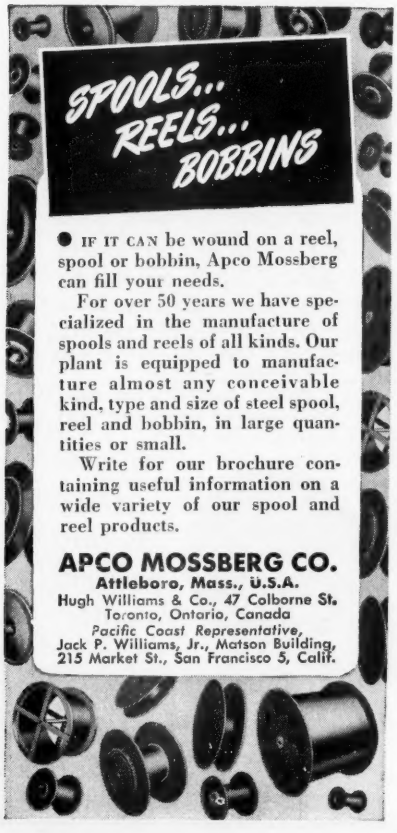


MICRO HARDNESS

By checking grain hardness with the Eberbach Micro Hardness Tester the user can accurately determine hardness of very fine wire. For use with metallurgical microscope equipment.

Write for complete information, our Bulletin MHT.

Eberbach & Son Company
Laboratory Apparatus & Supplies
Ann Arbor, Mich.
Established 1842



● IF IT CAN be wound on a reel, spool or bobbin, Apco Mossberg can fill your needs.

For over 50 years we have specialized in the manufacture of spools and reels of all kinds. Our plant is equipped to manufacture almost any conceivable kind, type and size of steel spool, reel and bobbin, in large quantities or small.

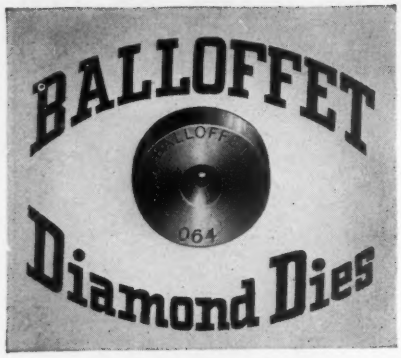
Write for our brochure containing useful information on a wide variety of our spool and reel products.

APCO MOSSBERG CO.
Attleboro, Mass., U.S.A.
Hugh Williams & Co., 47 Colborne St.
Toronto, Ontario, Canada
Pacific Coast Representative,
Jack P. Williams, Jr., Matson Building,
215 Market St., San Francisco 5, Calif.

EASTWOOD WIRE
CENTRIFUGALLY-CAST FOR QUALITY

Phosphor Bronze — WIRE, FLAT
Nickel Silver — WIRE, ROD

Eastwood-Nealley
CORPORATION
Belleville 9, New Jersey



Skill and accuracy in manufacture with the use of selected stones make Balloffet Diamond Dies the choice of the most critical users.

Large stock on hand of domestic and imported dies available for immediate shipment in sizes from .0004" to .081"

BALLOFFET
DIES AND NOZZLE CO., Inc.
6825 Adams St., Guttenberg, N. J.
Quality Diamond Dies Since 1870

adjustment on the control permits positive operation over varying distances between phototube and light source and under all conditions of ambient light.

★ ★ ★

THE unit is designed to provide completely reliable and continuous operation with unlimited life under conditions of extremely high temperature and humidity. Hermetically-sealed, oil-filled condensers and high wattage resisters are typical of components used throughout. It is rugged, withstands vibration, and simple to install.

★ ★ ★

FOR further information, write to Photoswitch, Inc., 77 Broadway, Cambridge, 42, Mass., for Bulletin PA478.

★ ★ ★

Aluminum Wire

(*Continued from page* 247)

Magnesium Alloy wire during the operation of drawing. We understand that a temperature of 280°C ± 10°C is vital although our experience does not bear this out. We have great difficulty in obtaining a small grain size whatever temperature is used. Should the 280°C be used to avoid large grain size, and does Mr. Lees see any connection between intercrystalline corrosion and a large grain size structure?

★ ★ ★

Mr. Lees

THAT is a point which I have not previously come across, but I think it would be surprising if the temperature range of 280°C ± 10°C was absolutely vital and, indeed higher temperatures than this are often recommended. As regards grain size, I am afraid that I cannot give a definite answer. I am not aware that much attention has been given to this question of grain size in the general work. It could very well be that there is such a grain size effect, and I know of some cases of what amount to intercrystalline attack in some copper alloys involving Bismuth. I think it was found to be worse with larger crystals so

VIANNEY
Famous Wire Drawing Diamond Dies

All sizes from .080 down to .00039 in stock from New York.

Appropriate profiles available for soft, medium and hard metals or to your specifications.

VIANNEY WIRE DIE WORKS
250 E. 43rd St., New York
V. J. Boulin, Manager

Oh, Miss Steele!

"PLEASE call the Oakite man about that acid inhibitor—That's right! Oakite Pickle Control No. 3 for hot sulphuric. Wonderful stuff! Tell him we need 3 carboys in a hurry. If you don't have his number, send a wire."

OAKITE PRODUCTS, INC.
52A Thames Street, NEW YORK 6, N. Y.
Technical Representatives in Principal Cities of U.S. & Canada

OAKITE
REG. U.S. PAT. OFF.
Specialized Industrial Cleaning
MATERIALS • METHODS • SERVICE

BORAX

More shops are turning to this most satisfactory coating material. It is easy and safe to handle. Does not create dust nuisance.

Pins of wire which have been properly washed after the acid dip, sul coated and then coated with Borax have been satisfactorily drawn after remaining in storage for several weeks.

Borax coated wire used with proper lubricant will increase die life.

Demonstrate the effectiveness of Borax with a fair trial in your own shop as others have done.

Bulletin Submitted on Request

PACIFIC COAST BORAX COMPANY
NEW YORK • CHICAGO • LOS ANGELES

DIAMOND DIES .0006 - .120 DIAMOND POWDER
INDUSTRIAL AJAX SUPPLIES INC.
R.R. 4, P.O. Box 66, Fort Wayne, Ind.

NEW ENGLAND WIRE DIE CO.
7 Forsberg St., Worcester, Mass.
EXPERT RECUTTING
DIAMOND DIES, DIAMOND POWDERS
Eastern Representative of
Ajax Industrial Supplies, Inc.

DIAMONDS for WIRE DRAWING DIES and CUTTING TOOLS
DIAMOND POWDER UNIFORM QUALITY
CHAMPION DIAMOND COMPANY, INC. 551 Fifth Ave., New York 17

DIAMOND DIES
.000's to .132
Fort Wayne Wire Die Inc.
2625 E. Pontiac St. Fort Wayne, Ind.

DIAMOND WIRE DRAWING DIES
INDIANA WIRE DIE COMPANY
314-324 E. Wallace St.,
Fort Wayne, Indiana

Finishing and Recutting
Diamond and Carbide
Wire Drawing Dies our specialty
HOOSIER WIRE DIE, INC.
P. O. Box 423, FT. WAYNE, IND.

that one could perhaps draw an analogy between the two.

★ ★ ★

Mr. Roebuck

IT is possible to obtain large grain growth by the application of a very light reduction at the first pass subsequent to annealing.

★ ★ ★

Dr. Goodacre

WHAT is the rate of formation of Aluminium Magnesium compound due to temperatures of 70/100°C?

★ ★ ★

Mr. Lees

IT is slow and takes hours rather than minutes.

★ ★ ★

Mr. Hird

UPON occasions we have been unable to obtain hot-rolled Aluminium rods and have to use extruded rods, we are told that the only difference, given the same analysis, is that the extruded material when drawn, will possess lower qualities of conductivity than wire produced from hot-rolled material. Cannot the conductivity be increased by the application of Heat-treatment or is there no remedy for the fault.

★ ★ ★

Mr. Lees

THIS difference between hot-rolled and extruded material is well known, although its cause is obscure. Extruded rod is known to be different structurally compared with hot-rolled rod.

★ ★ ★

DIAMOND CARBIDE
DIES
KELLY
WIRE DIE CORPORATION
19 W. 34th St. New York

L & H DIE COMPANY
Specialists in all types of
TUNGSTEN CARBIDE DIES
Namely Rounds, Squares, Flats, Hexagons, Extruding and Special Shapes.
Also Mandrels in all sizes.
RFD #4, Box 504-B, Royal Oak, Mich.
Telephone: Lincoln 1-8788

DIAMOND AND CARBIDE WIRE DRAWING DIES
RUSCH WIRE DIE CORPORATION
Croton-on-Hudson, N. Y.

CONSULTANT AND SPECIALIST
DRAWING LUBRICANTS
Hans C. Bick, Inc.
READING, PA.

TRAUWOOD
Patenting, Annealing, Tempering, Galvanizing, and Tinning equipment for wire.
TRAUWOOD ENGINEERING CO.
Cleveland, Ohio.

ZINC STRIP AND WIRE
THE PLATT BROS. & CO.
WATERBURY 90, CONN.

Wire Drawing Diamond Dies

COCHAUD
WIRE DIE CORPORATION
300 W. 56th St., NEW YORK
Tel. COlumbus 5-1340

WAYNE WIRE DIES STAND FOR QUALITY • QUALITY • QUALITY

in both DIAMONDS AND WORKMANSHIP
Highest quality dies manufactured for those who produce quality wire. Insist on the name "WAYNE" if you want long die life, high wire production and good wire.
WAYNE WIRE DIE CO. 200 PENNSYLVANIA AVE., HILLSIDE, N. J.
Phone EL 2-2456 For Prompt Service

WIRE DRAWING LUBRICANTS
APEX ALKALI PRODUCTS COMPANY
MAIN AND RECTOR STS.
PHILADELPHIA 27, PA.

WIRE DRAWING MACHINERY AND EQUIPMENT
Rod Frames — 16" Frames, 8" Frames — Take-Up Frame, Wire — Pointers — Puller Tongs. — General and heat resisting alloy castings for wire mill use.
Circulars on Request.
E. J. SCUDDER FOUNDRY & MACHINE CO.
TRENTON, N. J.

THE MONTGOMERY COMPANY
Established 1871
25 CANAL STREET
WINDSOR LOCKS, CONN.
BARE ELECTRIC TINSEL CONDUCTOR and RESISTANCE TINSEL CORDAGE • TINSEL LAME • DECORATIVE TINSEL THREADS, CORDS, LAMINETTES

CHEMICAL-PROOF CONSTRUCTION
LININGS TANKS HEATING UNITS
Crates, Yokes, Baskets
Rubber Koroseal Plastics Brick
Monel Stainless Lead
Impervious Graphite
HEIL PROCESS EQUIPMENT CORP.
12905 Elmwood Ave. Cleveland, Ohio

101 ENGINEERING VERSATILITY
Engineered Application of Heat in Continuous Materials Handling Systems
INDUSTRIAL OVENS, INC.
13825 TRISKETT ROAD
CLEVELAND 11, OHIO

SLEEPER & HARTLEY, Inc.
Designers and Builders
SPRING COILERS
WIRE WORKING MACHINERY
WIRE MILL EQUIPMENT
SPECIAL MACHINERY
Address Inquiries to
Box 1249
WORCESTER, MASS.

Mr. Garner

I CAN confirm that this difference does exist. I believe that it is due to the fact that extruded material does not give uniformity of conductivity from one end of a piece to the other, and this makes the use of hot-rolled material essential for electrical purposes.

★ ★ ★

Mr. Lees

THE front and back end effects are probably playing a part in these differences. Segregation of the impurities may be partly involved.

★ ★ ★

Dr. Goodacre

I DO not think that this is the case, but there is no doubt that extrusion has a somewhat structural effect which results in the front and back ends differing in conductivity.

★ ★ ★

Mr. Brook

WHICH is the better of the two ends, the front or the back end?

★ ★ ★

Mr. Peter Smith

WE have not found any difference between hot-rolled and extruded materials from the point of drawing or physical properties, but I certainly think that this is a question which should be thoroughly investigated.

★ ★ ★

PART II Welding For Wiredrawing will be published in the April issue of Wire and Wire Products.

★ ★ ★

The Wire Association 1949 Convention Ferrous Program Committee Meeting

THE Program Committee on Ferrous Papers of the Wire Association for the 1949 Annual Convention held its first meeting on January 24, 1949 in the Lexington Hotel, New York City. The personnel of the Committee present at this first meeting was as follows:

Fred M. Crapo, President—General Program Chairman
Indiana Steel & Wire Co.
Muncie, Ind.

SPECIALISTS IN
DRAWING COMPOUNDS
and
SOAP POWDERS
for
WIRE DRAWING
Established in 1906
NEIL C. POTTER
24 COMMERCE ST.
NEWARK 2, N. J.

RUESCH
Machinery For
Wire, Tube, and Brass Mills
409 Mulberry Street, Newark, N. J.

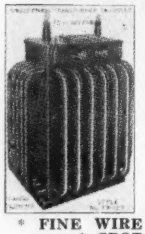
Annealing Pots and Boxes
Galvanizing Kettles
Lead and Spelter Pans
Pressure Vessels
National Annealing Box Co.
Established 1895
Washington, Penna.

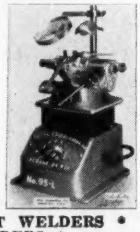
SC Designers and Builders of Gas-Fired Heat Treating Furnaces for Ferrous and Non-Ferrous Wire.
SURFACE COMBUSTION CORP.
Main Plant & General Offices:
Toledo, Ohio

DI-ACRO Bender No. 1
forms round, flat or square wire to accurately duplicated shapes.
Send for Catalog
O'Neil-Irwin Mfg. Co.
303 — 8th Ave.
Lake City, Minnesota

WATER PROOF and CREPE PAPER
in rolls of any size for wrapping coils and reels.
CREPE-KRAFT BARREL LINERS
THE CREPE-KRAFT COMPANY
Division of National Waterproof Papers Inc.
Camden, N. J.

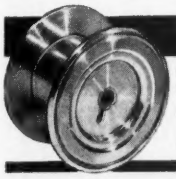
EISLER TRANSFORMERS
* STANDARD and SPECIAL *
AIR — OIL or WATER-COOLED
Sizes from ¼ to 400 KVA





* FINE WIRE BUTT WELDERS •
* SPOT WELDERS *
EISLER ENGINEERING CO., INC.
747 South 13th St. Newark 3, N. J.

TOOLS TALIDE DIES
WEAR PARTS
Talide Metal, the super hard tungsten carbide gives increased production, better finish, less down time and scrap on all wire mill operations.
METAL CARBIDES CORPORATION
YOUNGSTOWN 5, OHIO


ACROPAK
Drawn Aluminum Alloy Spools for Precision Wire Packaging
ACROMETAL PRODUCTS, INC.
604 Fifth Street North
MINNEAPOLIS 1, MINNESOTA

NEP · SUMFOAM
ACID INHIBITOR • PICKLING COMPOUND
THE WM. M. PARKIN CO.
HIGHLAND BLDG. PITTSBURGH 6, PA.

WIRE ANNEALING FURNACES and PROCESSES
COIL LOADING and STRIPPING MACHINES—WIRE SPIDERS
LEE WILSON ENGINEERING CO., INC.
Cleveland, Ohio ● ACademy 4670

Specify SAUEREISEN
ACIDPROOF CEMENTS—COMPOUNDS FOR
Tanks, Sewers, Stacks, Floors
Technical cements for all purposes.
Send sketches or samples
Sauereisen Cements Company · Pittsburgh 15, Penna.

METAL PICKLING EQUIPMENT
(Acid-Resisting)
Hairpin Type
Wire Pickling Yokes
CLARK E. GORDON, INC.
8-165 General Motors Building,
Detroit 2, Michigan

MUSIC WIRE
For Mechanical Purposes
Plain Polished, Tinned, Straightened and Cut Lengths
Fine Sizes — Special Wires — Strands and Cables — Spooled and Coiled Wires

Aluminum	Pure Iron
Annealed	Pure Nickel
Brass	Resistance
Copper	Stove Pipe Wire
Florists	Stainless
Monel	Straightened and Cut
Music Wire	Tag Wire
Nickel Silver	Trolling Wire
Oil Tempered	Leader Wire
Phosphor Bronze	
Picture Wire	

THE MALIN & CO.
2514 Vestry Ave., Cleveland 13, Ohio

A. E. Glen, Mgr. Die Sales—Chairman, Committee on Ferrous Papers
Carboloy Co., Inc.
Detroit, Mich.
Herbert B. Clark, Gen. Sales Mgr.
Vascoloy-Ramet Corporation
Waukegan, Ill.
James W. Galloway, Plant Engr.
B. Greening Wire Co., Ltd.
Hamilton, Ont., Canada
F. L. Hayden
Steel Company of Canada, Ltd.
Hamilton, Ont., Canada
Wm. E. Hitchcock, Jr., V. P.
Atlantic Wire Company
Branford, Conn.
D. Lewis, Chief Engr., Dev'l. Eng'g.
John A. Roebling's Sons Co.
Trenton, N. J.
A. M. Reeder, Met. Engr.
Jones & Laughlin Steel Corp.
Pittsburgh, Pa.

★ ★ ★

THE co-operation was excellent. The Committee gave very careful consideration to a number of suggestions that had previously been received for program papers. The program now in process of preparation will embrace papers on handling, plastic deformation, back-pull wire drawing, continuous cleaning, stainless steel, wire welding, and a symposium on die servicing.

★ ★ ★

THIS very able committee has formulated an excellent program which should be of outstanding assistance to all wire mill men in both operating and managing positions.

★ ★ ★

THE Committee is planning on another meeting in the Summer to complete its work for the 1949 Wire Association Convention.

★ ★ ★

TESTING MACHINES
for WIRE, RUBBER, PAPER, TEXTILES, etc.
SCOTT TESTERS, INC.
55 Blackstone St. • Providence, R. I.
"Standard of the World"

SPRING COILERS
14 Models
Wire ranges .003" to .750"
AUX. MILL EQUIPMENT

Gang Slitters
Flat Wire Mills
Tube & Rod Straighteners
BETTER BUILT — MORE ACCURATE
The TORRINGTON
MANUFACTURING COMPANY TORRINGTON, CONNECTICUT

WIRE WORKING MACHINERY
"Offered for Prompt Shipment"
WATERBURY-FARREL Continuous Wire Drawing Machines No. O Sleeve Type, Motor Driven with A. C. Motors, ¼" Cap. and Down.
WATERBURY & MANVILLE Cold Headers and Thread Rollers.
NILSON & BAIRD Nos. 00, 0, 1, 2, 3 and 4 Four-slides.
U. S. TOOL No. 33 MULTI-SLIDES.
SLEEPER & HARTLEY Nos. 1, 2, 3, 3½, 4 and 5 Universal Coilers.
TORRINGTON Nos. W11, W125, W24 Universal Coilers (some with Torsion Attachment).
LEWIS & SHUSTER Round and Shaped Wire Automatic Straightening and Cutting Machines.
NATIONAL MACHINERY EXCHANGE
128-138 MOTT ST. NEW YORK, N. Y.

WOOD REELS and SPOOLS
AMERICAN WOODWORKING COMPANY
1" to 60" Diameters
OVER 50 YEARS EXPERIENCE
1674 No. Lowell Avenue
Chicago, Ill.

Wire Measuring...
PRODUCTIMETERS
Send for Catalog No. 40
Precision-built for accuracy and speed. Most complete line offered
DURANT MANUFACTURING CO.
1918 N. Buffum Street Milwaukee 1, Wisconsin • 118 Orange Street Providence 3, R. I.

NILSON AUTOMATIC PRESS and FOUR SLIDE MACHINES
For Swaging, Stamping, Piercing, Blanking & Forming Coiled Metal.
THE A. H. NILSON MACHINE CO.
BRIDGEPORT, CONN., U.S.A.

HAVEG CORPORATION
NEWARK, DELAWARE
●
Manufacturers of Plastic Chemical Equipment

BOYD—FIDELITY WIRE SPOOLERS
CHARLES P. BOYD CORPORATION
1434 Callowhill Street
Philadelphia 30, Pa.

Wire Drawing Machinery
Featuring —
High Speed Upright Cone Machines.
Also —
Bull Blocks and Benches, Continuous Wire Drawing Machines, Spoolers, Pointers, String-up Machines, etc.
And —
Cold Heading Machinery.
WATERBURY FARREL FOUNDRY & MACHINE CO.
Waterbury, Conn.

LANCASTER, ALLWINE & ROMMEL
REGISTERED PATENT ATTORNEYS
Suite 438, 815—15th St., N. W.
Washington 5, D. C.

●

Patent and Trade-Mark Practice before U. S. Patent Office. Validity and Infringement Investigations and Opinions.
Booklet and form "Evidence of Conception" forwarded upon request.

KENNETH B. LEWIS
CONSULTING ENGINEER
Wire Mill Equipment, Layout and Practice
43 Midland St., Worcester, Mass.
Phone: Worcester 5-6033

Consultants on
SPRING DESIGN
Materials & Applications
Methods & Manufacturing
THE CARLSON COMPANY
277 Broadway New York 7, N. Y.
BArclay 7-2552

THE WALLACE G. IMHOFF CO.
Consultants in Zinc Coating
(Hot Galvanizing)
Hot Dip Tinning — Hot Lead Coating
905 SOUTH BEDFORD STREET
LOS ANGELES 35, CALIFORNIA

FATIGUE OF MATERIALS
LABORATORY
PRINCETON, N. J.
Box 367
Corrosion-fatigue testing of wire a specialty.

WIRE SPOOLING MACHINERY
ALL TYPES—ALL SIZES
ROBERT J. EMORY COMPANY
Sherman Ave. & Runyon St.
Newark 5, N. J.

FOR SALE

One (1) complete Wind Up Unit, consisting of tensioning device—3 wind ups and electrical controls. These Wind Ups handle Iron Reels 18" dia. Head x 10" Traverse. Each Unit consists of the tensioning device which handles three wires at a time and the electrical control and three separate wind ups, each driven by a constant torque variable speed motor capable of exerting a constant tension pull on the material being wound up. These units are in excellent condition. These units are capable of winding lead, solder wire, and copper wire. Reply Box 522, WIRE & WIRE PRODUCTS.

FOR SALE
INSULATED WIRE
MANUFACTURING MACHINERY (USED)

1—No. 3 Banbury Mixer with Gear Reduction Unit and Motor
3—42" Mixing Mills complete with 1 Gear Reduction unit and 1-150 HP Motor
1—24" Mixing Mill
1—No. 2 John Royle Rubber Strainer
1—No. 4 National Erie Rubber Strainer
2—20 wire Rubber Strip Insulating machines, complete with rolls—motors, payoff & takeup stands (wire sizes 8 to 18 incl.)
1—6 Wire Rubber Strip Insulating machine, complete with rolls—motor—and takeup stand for 6 Wires (wire sizes 1 to 6 incl.)
16—Universal Leesona No. 50 Winders (6 spindles each)
550—N.E. Butt B6-16 Carrier Braiders, complete with Mossberg Carriers—capstans, payoff and individual takeup stands with mechanical traverse
25—N.E. Butt B6-Double deck 20x24 carrier Braiders, complete with Butt Carriers, capstans, payoff and takeup stands
40—N.E. Butt No. 2—12x16x20 Carrier Braiders, complete with Butt Carriers, capstans, payoff and takeup stands
100—N.E. Butt B6-16x16x20 Carrier Braiders, complete with Carriers, capstans, payoff and takeup stands
6—N.E. Butt No. 3—24x28x32 Carrier Braiders, complete with Butt Carriers and capstans
6—N.E. Butt No. 3—28x32 Carrier Braiders, complete with Butt Carriers and capstans
200—Wardwell—High Frame 16 Carrier Braiders
2—Horizontal Vulcanizers with quick opening door
6—Double Side, High speed reel takeup stands, complete with payoffs—Sparking electrodes and Patch Vulcanizing Presses
1—Terkelsen Large Coil Wrapping Machine with Motor (new)
10—Lift trucks
250—Hardwood Skids with metal legs
Also other miscellaneous machinery and reels too numerous to mention, used in the wire industry. Above equipment will be sold subject to Prior Sale—as is, where is and may be seen by appointment.

Apply BOX No. 521
WIRE & WIRE PRODUCTS

SURPLUS WIRE—40,000 LBS.
21-gauge — Bare — On Reels
Tinned — Rustproof
7-Strand: 6 Steel, 1 Copper
10c lb. — 550 ft. per lb.
SURPLUS TRADING CO., INC.
128 N. 3rd Street, Phila. 6, Pa.

Wire straightening & cutting.
Bright basic, size 6 to 14 ga.
Write or phone.
BROSKI BROS. WIRE & IRON WORKS
3916 Bennington, Kansas City, Mo.
Phone Wabash 3360

WANTED

Man to take charge of Copper Wire Enameling and Copper Wire Drawing. Excellent Opportunity. Permanent position. Located in Chicago. Reply Box No. 516 % WIRE & WIRE PRODUCTS.

WANTED

Aluminum round Wire — 56 S in coils—any temper—any quantity—any diameter from .100" to .250". Principals only.
COLONIAL STOVE COMPANY
4041 Ridge Ave.
PHILADELPHIA 29, PA.

FOR SALE

At
Really
SACRIFICED
PRICES *

(26)

50 & 100 KW
Westinghouse
BELL TYPE
ELECTRIC ANNEALING
Or
TEMPERING FURNACES
(with extra Bases)

Temperature Range
300°F to 1200°F

Forced Circulation
with High Pressure
High Velocity Fan

3/60/440 Volts
or with Transformer for 220 Volts
(or other voltages)

Complete
with
L & N
MICROMAX
Strip Chart
TEMPERATURE
CONTROLLING &
RECORDING PANELS
and
ATMOSPHERE
GAS
CONTROL PANELS

New '41 to '43
not used
SINCE 1945

LOCATION: Cincinnati, Ohio

*ACT IMMEDIATELY and take advantage of still lower prices before moving.

Wire, Phone or Write
Today!

L. J. LAND, INC.
149 GRAND STREET
NEW YORK 13, N. Y.
Phone: CAnal 6-6976

Index to Advertisers

A

Acrometal Products, Inc. 285
Ajax Industrial Supplies, Inc. 283
Aluminum Company of America 211
American Chemical Paint Co. 269
American Insulating Machinery Company 280
American Lanolin Company 281
American Woodworking Company 285
Angier Corporation, The 273
Apco Mossberg Company 281
Apex Alkali Products Co. 284
Armco Steel Corporation 212

B

Balloffet Dies & Nozzle Co., Inc. 282
Bethlehem Steel Co. 202
Bick, Hans Co., Inc. 283
Black Industries, Inc. 219
Blashill, Arthur 271
Boyd, Chas. P. Corp. 285
Bridge Mfg. Co., Inc. 256

C

Carboloy Company, Inc. 201
Carl-Mayer Corp., The 279
Carlson Company, The 286
Champion Diamond Co. 283
Chase Brass & Copper 205
Clark, J. L. Mfg. Co. 268
Cleveland Tramrail Division of the
Cleveland Crane & Engineering Co. 216
Cochaud Wire Die Corporation 283
Continental Steel Corp. 220
Crepe-Kraft Co., The
Division of National Waterproof Papers, Inc.... 284

D

Davis, R. L., Electric Co. 210
Dillon, W. C. & Co., Inc. 272
Du Pont, E. I. de Nemours, Co. 221
Durant Mfg. Co. 285
Durkee Mfg. Co. 279

E

Eastern Carbide Corp. 270
Eastern Nail Company 273
Eastwood-Nealley Corp. 281
Eberbach & Son Company 281
Eisler Engineering Co. 284
Electric Furnace Company ..... Back Cover
Emory, Robert J. Company 286
Entwistle, James L. Co. 204

F

Fatigue of Materials Laboratory 286
Firth-Sterling Steel & Carbide Corp. 230
Fort Wayne Wire Die, Inc. 283

G

Glader, Wm., Machine Works 257
Gordon, Clark E., Inc. 285

H

Harper Electric Furnace Co. 278
Haveg Corporation 285
Heil Process Equipment Corp. 284
Hoosier Wire Die, Inc. 283
Howsam Spool Co. 279
Hubbard Spool Company 218
Hudson Wire Co. 208
Hughesville Machine & Tool Co. 258

I

Imhoff, Wallace G. 286
Indiana Wire Die Company 283
Industrial Ovens, Inc. 284

J

Johnson Steel & Wire Co., Inc. 275

K

Kelly Wire Die Corp. 283
Keystone Steel & Wire Co. 255

L

L. & H. Die Co. 283
Lancaster, Allwine & Rommel 286
Lewis, K. B. 286
Lewis, Machine Co., The 280

M

Magnus Chemical Co. 213
Magnuson Products Corp. 274
Malin & Company, The 285
Martin, Glenn L., Company 203
Metal & Thermit Corp. 272
Metal Carbides Corporation 285
Mettler Machine Tool, Inc. 265
Micro Products Company 254
Miller, R. H. Company, Inc. 260
Modern Plastic Machinery Corp. 274
Montgomery Company, The 284
Morgan Construction Company 228
Mossberg Pressed Steel Corp. 259

N

National Annealing Box Co. 284
National Machinery Exchange 285
New England Butt Company 267
New England Wire Die Co. 283
Niles Steel Products Div., Republic Steel Corp..... 229
Nilson, A. H., Machine Co. 285
North Anson Reel Company 235
Norton Company, The ..... 223 and 275

O

Oakite Products, Inc. 282
O'Neil-Irwin Mfg. Co. 284
Owens-Corning Fiberglas Corp. 206

P

Pacific Coast Borax Co. 282
Parkin, Wm. M. Co., The 285
Pittsburgh Cut Wire Co. 264
Platt Brothers & Co., The 283
Potter, Neil C. 284

R

Robertson, John, Co., Inc. 207
Rockwell, W. S., Company 276
Roebling's, John A., Sons Company 215
Roos, Tool & Mfg. Co. 278
Ross, J. O., Engineering Corp. 266
Royle, John & Sons 261
Ruesch, H. J. Machine Co. 284
Rusch Wire Die Corporation 283

S

Sauereisen Cement Co. 285
Scott Testers, Inc. 285
Scudder, E. J. Foundry & Machine Co. 284
Sjogren Tool and Machine Co., Inc. 277
Sleeper & Hartley, Inc. 284
Standard Industrial Compounds Co. 217
Steel Equipment Corp. 263
Surface Combustion Corp. 284
Swift & Company 225
Syncro Machine Company 214

T

Torrington Mfg. Co. 285
Trauwood Engineering Co. 283
Twitchell, E. W., Inc. 276

V

Vascoloy-Ramet Corp. 226
Vaughn Machinery Co. ..... Front Cover
Vianney Wire Die Works 282

W

Waterbury Farrel Foundry & Machine Co. 285
Watson Machine Company ..... Inside Back Cover
Wayne Wire Die Co. 283
Wean Equipment Corp. ..... Inside Front Cover
Wickwire-Spencer Steel Division
Colorado Fuel & Iron Corp. 224
Willey's Carbide Tool Co. 277
Wilson, Lee, Engineering Co., Inc. 285
Wire & Textile Machinery, Inc. 280

Y

Youngstown Sheet & Tube Company 209
Youngstown Welding & Engineering Corp. 262

WHERE TO BUY

For more complete information, consult the annual Wire and Wire Products Directory, Index & Buyer's Guide.

ABRASIVES—
Norton Co., Worcester, Mass.

ACID INHIBITORS—
American Chemical Paint Co., Ambler, Pa.
Oakite Products, Inc., New York, N. Y.
Parkin, Wm. M., Co., Pittsburgh, Pa.

ACID-PROOF CONSTRUCTION
Haveg Corporation, Newark, Del.
Heil Process Equipment Corp., Cleveland, Ohio.
Sauereisen Cements Co., Pittsburgh, Pa.

ANNEALING MACHINES—Open Flame
Syncro Machine Co., Perth Amboy, N. J.

ANNEALING POTS AND BOXES—
National Annealing Box Co., Washington, Penna.
Scudder, E. J., Foundry & Machine Co., Trenton, N. J.

ARMORING EQUIPMENT—
American Insulating Mach'y. Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.
Wire & Textile Machy., Inc., Pawtucket, R. I.

BAKERS—Rod and Wire
Carl-Mayer Corp., The, Cleveland, Ohio.
Morgan Construction Co., Worcester, Mass.
Ross, J. O., Engr. Corp., New York, N. Y.

BAR STOCK—Stainless Steel
Armco Steel Corp., The, Middletown, Ohio.
American Steel & Wire Company, Cleveland Chicago, New York.
Columbia Steel Co., San Francisco, Calif.
U. S. Steel Export Company, New York, N. Y.

BENDERS—
O'Neil Irwin Mfg. Co., Minneapolis, Minn.

BOBBINS—Braider & Wire Weaving
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Company, Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Wire & Textile Machinery, Inc., Pawtucket, R.I.

BORAX—Wire Drawing
Pacific Coast Borax Corp., New York, N. Y.

BORON CARBIDE—
Norton Co., Worcester, Mass.

BRAKES—Pneumatic
Entwistle, Jas. L. Co., Pawtucket, R. I.

BRAKES & SHEARS—
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

CABLE LACQUERING OVENS—
Industrial Ovens, Inc., Cleveland, O.

CARRIERS—Braider, High Speed
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.
New England Butt Co., Providence, R. I.
Wire & Textile Machinery, Inc., Pawtucket, R.I.

CASTINGS—Wire Mill
Scudder, E. J., Fdry. & Mach. Co., Trenton, N.J.

CEMENTS—Acid Proof
Sauereisen Cements Co., Pittsburgh, Pa.

CEMENTS—Refractory
Norton Co., Worcester, Mass.
Sauereisen Cements Co., Pittsburgh, Pa.

CHEMICALS—Cleaning
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Magnus Chemical Co., Garwood, N. J.
Magnuson Products Corporation, Brooklyn, N. Y.
Metal & Thermit Corp., New York, N. Y.
Oakite Products, Inc., New York, N. Y.
Parkin, Wm. M., Co., Pittsburgh, Pa.
Standard Industrial Compounds Co., Inc., Chicago, Ill.

CLEANERS—Metal and Hand
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Phila., Pa.
Magnus Chemical Co., Garwood, N. J.
Metal & Thermit Corp., New York, N. Y.
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds Co., Inc., Chicago, Ill.

CLEANING & PICKLING EQUIP.—
Cleveland Tramrail Div., of the Cleveland Crane & Engineering Co., Wickliffe, O.
Haveg Corp., Newark, Del.
Heil Process Equipment Corp., Cleveland, Ohio.
Metal & Thermit Corp., New York, N. Y.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wean Equipment Corp., Cleveland, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

CLOTH TESTERS—
Scott Testers, Inc., Providence, R. I.

CLOTH—WIRE, All Metals
Roebling's, John A. Sons, Co., Trenton, N. J.
Wickwire Spencer Steel Division, Colorado Fuel & Iron Corp., Buffalo, N. Y.

COATING COMPOUNDS—
Apex Alkali Products Co., Philadelphia, Pa.
Magnus Chemical Co., Garwood, N. J.
Miller, R. H., Co., Inc., Homer, N. Y.
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds Co., Inc., Chicago, Ill.

COILERS—Sheet, Strip and Wire
Entwistle, Jas. L. Co., Pawtucket, R. I.
Morgan Construction Co., Worcester, Mass.
Ruesch, H. J. Machine Co., Newark, N. J.
Torrington Mfg. Co., Torrington, Conn.
Wean Equipment Corp., Cleveland, Ohio.

COLD HEADERS—
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

COMPOUNDS—Coppering
American Chemical Paint Co., Ambler, Pa.

COMPOUNDS—Diamond
Engis Equipment Co., Chicago, Ill.
Magnus Chemical Co., Garwood, N. J.

COMPOUNDS—Metal Finishing
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Metal & Thermit Corp., New York, N. Y.

COMPOUNDS—Rust Preventing
American Chemical Paint Co., Ambler, Pa.
American Lanolin Co., Lawrence, Mass.
Apex Alkali Products Co., Philadelphia, Pa.
Magnus Chemical Co., Garwood, N. J.
Oakite Products, Inc., New York, N. Y.

COMPOUNDS—Rust Removing
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds Co., Inc., Chicago, Ill.

COMPOUNDS—Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Bick, Hans C., Inc., Reading, Pa.
Magnus Chemical Co., Garwood, N. J.
Magnuson Products Corporation, Brooklyn, N. Y.
Miller, R. H. Co., Inc., Homer, N. Y.
Oakite Products, Inc., New York, N. Y.
Pacific Coast Borax Corp., New York, N. Y.
Potter, Neil C., Newark, N. J.
Standard Industrial Compounds Co., Inc., Chicago, Ill.
Swift & Company, Chicago, Ill.

COPHOLDERS—Steel
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Company, Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Wire & Textile Machinery, Inc., Pawtucket, R.I.

CORROSION PREVENTIVES
Angier Corp., The, Framingham, Mass.

CRANES—Wire Mill
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

CUTTING TOOLS—Carbide
Carboloy Co., Inc., Detroit, Mich.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth-Sterling Steel & Carbide Corp., McKeesport, Pa.
Metal Carbides Corporation, Youngstown, Ohio.
Rusch Wire Die Corp., Croton-on-the-Hudson, New York.
Vascoloy-Ramet Corp., North Chicago, Ill.
Willey's Carbide Tool Co., Detroit, Mich.

CUTTING TOOLS—Wire
Porter, H. K., Inc., Everett, Mass.

DIAMONDS—Industrial
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Champion Diamond Co., New York, N. Y.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
Vianney Wire Die Wks., New York, N. Y.
Wayne Wire Die Co., Hillside, N. J.

DIAMOND POWDERS—
Champion Diamond Co., New York, N. Y.
Eastern Carbide Corp., New Rochelle, N. Y.
Hoosier Wire Die, Inc., Ft. Wayne, Ind.
Indiana Wire Die Co., Ft. Wayne, Ind.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
Wayne Wire Die Co., Hillside, N. J.

DIAMOND TOOLS—
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel & Carbide Corp., McKeesport, Pa.
Indiana Wire Die Co., Ft. Wayne, Ind.
Metal Carbides Corporation, Youngstown, Ohio.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
Wayne Wire Die Co., Hillside, N. J.

DIES—Cold Heading
Carboloy Co., Inc., Detroit, Mich.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth-Sterling Steel & Carbide Corp., McKeesport, Pa.
Indiana Wire Die Co., Ft. Wayne, Ind.
Metal Carbides Corporation, Youngstown, Ohio.
Vascoloy-Ramet Corp., No. Chicago, Ill.

DIES—Diamond
Ajax Industrial Supplies, Inc., Fort Wayne, Ind.
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Cochaud Wire Die Corp., New York, N. Y.
Ft. Wayne Wire Die, Inc., Fort Wayne, Ind.
Hoosier Wire Die, Inc., Ft. Wayne, Ind.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
Vianney Wire Die Wks., New York, N. Y.
Wayne Wire Die Co., Hillside, N. J.

DIES—Eyelet
Kelly Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.

DIES—Lead Extrusion
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel & Carbide Corp., McKeesport, Pa.
L & H Die Co., Royal Oak, Mich.
Metal Carbides Corporation, Youngstown, Ohio.
Robertson, John, Co., Brooklyn, N. Y.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
Wayne Wire Die Co., Hillside, N. J.
Willey's Carbide Tool Co., Detroit, Mich.

DIES—Pointing
Sjogren Tool and Machine Co., Auburn, Mass.

DIES—Repairs & Re-Cutting
Ajax Industrial Supplies, Inc., Fort Wayne, Ind.
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Detroit, Mich.
Cochaud Wire Die Corp., New York, N. Y.
Firth-Sterling Steel & Carbide Corp., McKeesport, Pa.
Ft. Wayne Wire Die, Inc., Fort Wayne, Ind.
Hoosier Wire Die, Inc., Ft. Wayne, Ind.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
L & H Die Co., Royal Oak, Mich.
Metal Carbides Corp., Youngstown, O.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Wks., New York, N. Y.
Wayne Wire Die Co., Hillside, N. J.
Willey's Carbide Tool Co., Detroit, Mich.

DIES—Rod and Tube Drawing
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth-Sterling Steel & Carbide Corp., McKeesport, Pa.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
L & H Die Co., Royal Oak, Mich.

WHERE TO BUY, Continued

Metal Carbides Corp., Youngstown, O.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Wks., New York, N. Y.
Willey's Carbide Tool Co., Detroit, Mich.

DIES—Sintered Carbide
Hoosier Wire Die, Inc., Fort Wayne, Ind.

DIES—Special Shapes, Etc.
Eastern Carbide Corp., New Rochelle, N. Y.
Hoosier Wire Die, Inc., Ft. Wayne, Ind.
Indiana Wire Die Co., Fort Wayne, Ind.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.

DIES—Tantalum Carbide
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel & Carbide Corp., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corp., Youngstown, Ohio.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Wks., New York, N. Y.

DIES—Tubing
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.

DIES—Tungsten Carbide
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth-Sterling Steel & Carbide Corp., McKeesport, Pa.
Hoosier Wire Die, Inc., Ft. Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
L & H Die Co., Royal Oak, Mich.
Metal Carbides Corp., Youngstown, Ohio.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Wks., New York, N. Y.
Wayne Wire Die Co., Hillside, N. J.
Willey's Carbide Tool Co., Detroit, Mich.

DRAW BENCHES—
(See MACHINERY—Draw Benches)

DRUMS—Flange Steel
Howsam Spool Co., Aurora, Ill.
Hubbard Spool Company, Chicago, Ill.

DRUMS—Vulcanizing
Mossberg Pressed Steel Corp., Attleboro, Mass.
Watson Machine Co., The, Paterson, N. J.

DRYING EQUIPMENT—
Carl-Mayer Corp., The, Cleveland, Ohio.
Industrial Ovens, Inc., Cleveland, Ohio.
Modern Plastic Machinery Corp., Lodi, N. J.
Rockwell, W. S. Co., Fairfield, Conn.
Ross, J. O., Engineering Corp., New York, N. Y.

ENGINEERS—Consulting Spring Design
Carlson, Co., The, New York, N.Y.

ENGINEERS—Consulting Wire Mill
Lewis, Kenneth B., Worcester, Mass.

EQUIPMENT—Insulation Testing
Davis, R. L., Elec. Co., Wallingford, Conn.
Entwistle, James L., Co., Pawtucket, R. I.

EYELETS—Brass or Zinc
Platt Bros. & Co., The, Waterbury, Conn.

FLUXES—Soldering
American Chemical Paint Co., Ambler, Pa.

FOAM PRODUCING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Parkin, Wm. M. Co., Pittsburgh, Pa.

FRICTION PAY-OFF STANDS—
Industrial Ovens, Inc., Cleveland, Ohio.

FURNACES—Annealing
Ajax Electric Co., Inc., Philadelphia, Pa.
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, Ohio.
Harper Electric Furnace Corp., Niagara Falls, N. Y.
Rockwell, W. S., Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio.
Trauwood Engr. Co., Cleveland, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

FURNACES—Automatic
Carl-Mayer Corp., The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio.
Surface Combustion Corp., Toledo, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

FURNACES—Brazing
Electric Furnace Co., Salem, Ohio.
Firth-Sterling Steel & Carbide Corp., McKeesport, Pa.
Rockwell, W. S., Co., Fairfield, Conn.

FURNACES—Bright Annealing
Electric Furnace Co., Salem, Ohio.
Harper Electric Furnace Corp., Niagara Falls, N. Y.
Rockwell, W. S., Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

FURNACES—Electric
Eisler Engineering Co., Newark, N. J.
Electric Furnace Co., Salem, Ohio.
Harper Electric Furnace Corp., Niagara Falls, N. Y.
Rockwell, W. S., Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio.
Trauwood Engineering Co., The, Cleveland, Ohio.

FURNACES—Galvanizing Equipment
Ajax Electric Co., Inc., Philadelphia, Pa.
Electric Furnace Co., Salem, Ohio.
Rockwell, W. S., Co., Fairfield, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Surface Combustion Corp., Toledo, Ohio.
Trauwood Engineering Co., The, Cleveland, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

FURNACES—Hard'ing & Temp'ing
Ajax Electric Co. Inc., Philadelphia, Pa.
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, Ohio.
Harper Electric Furnace Corp., Niagara Falls, N. Y.
Rockwell, W. S., Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio.
Trauwood Engr. Co., The, Cleveland, Ohio.

FURNACES—Lead Melting
Electric Furnace Co., Salem, Ohio.
Robertson, John, Co., Brooklyn, N. Y.
Rockwell, W. S., Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio.

FURNACES—Non-Oxidizing
Ajax Electric Co., Inc., Philadelphia, Pa.
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, Ohio.
Surface Combustion Corp., Toledo, Ohio.

FURNACES—Normalizing
Ajax Electric Co., Inc., Philadelphia, Pa.
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, Ohio.
Harper Electric Furnace Corp., Niagara Falls, N. Y.
Rockwell, W. S., Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio.

FURNACES—Pot (Oil, Gas, Electric)
Ajax Electric Co., Inc., Philadelphia, Pa.

FURNACES—Resistance Heating, Strand
Trauwood Engineering Co., Cleveland, Ohio.

FURNACES—Salt Bath
Ajax Electric Co., Inc., Philadelphia, Pa.
Electric Furnace Co., Salem, Ohio.
Rockwell, W. S., Co., Fairfield, Conn.
Surface Combustion Corporation, Toledo, O.
Trauwood Engineering Co., The, Cleveland, Ohio.

FURNACES—Wire, Strip & Sheet
Carl-Mayer Corp., The, Cleveland, Ohio.
Eisler Engineering Co., Newark, N. J.
Electric Furnace Co., Salem, Ohio.
Harper Electric Furnace Corp., Niagara Falls, N. Y.
Rockwell, W. S., Co., Fairfield, Conn.
Surface Combustion Corporation, Toledo, O.
Trauwood Engineering Co., The, Cleveland, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

GALVANIZING EQUIPMENT—
Steel Equipment Co., Cleveland, Ohio.
Wean Equipment Corp., Cleveland, Ohio.

GALVANIZING KETTLES—
National Annealing Box Co., Washington, Penna.

GRINDERS—Roll
Norton Co., The, Worcester, Mass.

HAMMERS—Swaging
Sjogren Tool and Machine Co., Auburn, Mass.

HOISTS—Electric Travelling
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, Ohio.

HOOKS—Pickling and Liming
Gordon, Clark E., Detroit, Mich.
Youngstown Welding & Engineering Co., Youngstown, Ohio.

INHIBITORS—Pickling
American Chemical Paint Co., Ambler, Pa.
Oakite Products, Inc., New York, N. Y.
Parkin, Wm. M., Co., Pittsburgh, Pa.

INSULATING LACQUERING SYSTEMS—Continuous
American Insulating Machine Co., Phila., Pa.
Industrial Ovens, Inc., Cleveland, Ohio.

INSULATING MATERIALS—
Du Pont de Nemours, E. I., Co., Wilmington, Del.
General Electric Co., Schenectady, N. Y.
Martin, Glenn L., Company, Baltimore, Md.
Owens Corning Fiberglas Corp., Toledo, O.
Twitchell, E. W., Philadelphia, Pa.

LATHES—Die Reaming
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel & Carbide Corp., McKeesport, Pa.
Morgan Construction Co., Worcester, Mass.
Roos, Tool & Mfg. Co., Montclair, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Machine Co. Waterbury, Conn.

LIME—
Warner Co., Philadelphia and Bellefonte, Pa.

LININGS—Acid and Alkali Proof
Haveg Corp., Newark, Del.
Heil Process Equipment Corp., Cleveland, Ohio.
Sauereisen Cements Co., Pittsburgh, Pa.

LUBRICANTS—For Metal Cutting, Stamping and Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Magnus Chemical Co., Garwood, N. J.
Miller, R. H., Co., Inc., Homer, N. Y.
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds Co., Inc., Chicago, Ill.

LUBRICANTS—Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Bick, Hans C., Inc., Reading, Pa.
Magnus Chemical Co., Garwood, N. J.
Miller, R. H., Co., Homer, N. Y.
Oakite Products, Inc., New York, N. Y.
Potter, Neil C., Newark, N. J.
Standard Industrial Compounds Co., Inc., Chicago, Ill.
Swift & Company, Chicago, Ill.

LUMBER—Wire Mill, carload lots for lagging and car blocking.
North Anson Reel Co., North Anson, Maine

MACHINERY—Armoring (Cable, Wire Hose)
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Braiding
Mossberg Pressed Steel Corp., Attleboro, Mass.
New England Butt Co., Providence, R. I.
Wire & Textile Mach'y, Inc., Pawtucket, R. I.

MACHINERY—Brazing
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Bunching
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.
Wire & Textile Machinery, Inc., Pawtucket, R.I.

MACHINERY—Bundling, Scrap
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Cable, Electric
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Chain Making
Nilson, A. H. Machine Co., The, Bridgeport, Conn.

MACHINERY—Cable, Rope Closing
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

WHERE TO BUY, Continued

MACHINERY—Coil Winding
Boyd, Charles P., Corp., Philadelphia, Pa.
Rockwell, W. S., Co., Fairfield, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Coilers
Boyd, Charles P., Corp., Philadelphia, Pa.
Eisler Engineering Co., Newark, N. J.
Entwistle, Jas. L. Co., Pawtucket, R. I.
Morgan Construction Co., Worcester, Mass.
National Machinery Exchange (used), New York, N. Y.
New England Butt Co., Providence, R. I.
Ruesch, H. J. Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.
Watson Machine Co., Paterson, N. J.
Wean Equipment Corp., Cleveland, Ohio.
Wire & Textile Machinery, Inc., Pawtucket, R. I.

MACHINERY—Copper Wire Drawing and Rolling
American Insulating Mach'y Co., Phila., Pa.
National Machinery Exchange (used), New York, N. Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Covering Wire
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Royle, John & Sons, Paterson, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Cutting
Eisler Engineering Co., Newark, N. J.
Lewis Machine Co., The, Cleveland, Ohio.
Mettler Machine Tool, Inc., New Haven, Conn.
National Mach'y Exch. (Used) New York, N. Y.
Nilson Machine Co., A. H., Bridgeport, Conn.
Porter, H. K., Inc., Everett, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Die Making
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel & Carbide Corp., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Roos, Tool & Mfg. Co., Montclair, N. J.
Wayne Wire Die Co., Hillside, N. J.

MACHINERY—Draw Benches
Morgan Construction Co., Worcester, Mass.
Ruesch, H. J., Machine Co., Newark, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Edging
Torrington Mfg. Co., Torrington, Conn.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Enameling
American Insulating Mach'y Co., Phila., Pa.
Industrial Ovens, Inc., Cleveland, Ohio.
Rockwell, W. S., Co., Fairfield, Conn.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Extruding
Modern Plastic Machinery Co., Lodi, N. J.
Robertson, John, Co., Brooklyn, N. Y.
Royle, John, & Sons, Paterson, N. J.
Wire & Textile Machinery, Inc., Pawtucket, R.I.

MACHINERY—Fence
Blashill, Arthur, Woodstock, Ont., Canada.
Glader, Wm., Machine Works, Chicago, Ill.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Filament Coil Winding
Eisler Engineering Co., Newark, N. J.

MACHINERY—Flat Wire
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Galvanizing
(See Galvanizing Equipment)

MACHINERY—Galvanizing Wire
Sleeper & Hartley, Inc., Worcester, Mass.
Steel Equipment Co., Cleveland, Ohio.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wean Equipment Corp., Cleveland, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

MACHINERY—Gang Winders
Entwistle, Jas. L. Co., Pawtucket, R. I.
Ruesch, H. J., Machine Co., Newark, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Grinding
Norton Co., The, Worcester, Mass.

MACHINERY—Insulating
American Insulating Mach'y Co., Phila., Pa.
Modern Plastic Machinery Co., Lodi, N. J.
New England Butt Co., Providence, R. I.
Royle, John & Sons, Paterson, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Lead Encasing Presses, etc.
Robertson, John Co., Brooklyn, N. Y.

MACHINERY—Lead Stripping
Robertson, John Co., Brooklyn, N. Y.

MACHINERY—Lock Washer
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Magnet Wire
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Material Handling
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

MACHINERY—Measuring Wire & Cable
Durant Mfg. Co., Milwaukee, Wis.
Entwistle, Jas. L. Co., Pawtucket, R.I.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Nail and Tack
Black Industries, Cleveland, Ohio.
Eastern Nail Co., Providence, R. I.
Glader, Wm., Machine Works, Chicago, Ill.
National Mach'y Exch. (Used), New York, N.Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Panning
American Insulating Mach'y Co., Phila., Pa.
Syncro Machine Co., Perth Amboy, N. J.
Wire & Textile Machinery, Inc., Pawtucket, R.I

MACHINERY—Pickling
Gordon, Clark E., Detroit, Mich.
Youngstown Welding & Engineering Company, Youngstown, Ohio.

MACHINERY—Pointing
Morgan Construction Co., Worcester, Mass.
National Mach'y Exch. (Used), New York, N.Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry & Mach. Co., Trenton, N.J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Rod Mill
Morgan Construction Co., Worcester, Mass.
Ruesch, H. J., Machine Co., Newark, N. J.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Rolling Mill
Morgan Construction Co., Worcester, Mass.
National Mach'y Exch. (Used), New York, N.Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Rubber Insulating
Royle, John & Sons, Paterson, N. J.
Wire & Textile Machinery, Inc., Pawtucket, R.I.

MACHINERY—Rubber Tubing and Straining
New England Butt Co., Providence, R. I.
Royle, John & Sons, Paterson, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Wire & Textile Machinery, Inc., Pawtucket, R.I.

MACHINERY—Screw Wire
National Mach'y Exch. (Used), New York, N.Y.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Special
American Insulating Mach'y Co., Phila, Pa.
Black Industries, Cleveland, Ohio.
Eastern Nail Co., Providence, R. I.
Emory, Robert J., Co., Newark, N. J.
Entwistle, Jas. L. Co., Pawtucket, R. I.
New England Butt Co., Providence, R. I.
Ruesch, H. J. Machine Co., Newark, N. J.
Scudder, E. J., Fdry & Mach. Co., Trenton, N.J.
Sjogren Tool and Machine Co., Auburn, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Watson Machine Co., Paterson, N. J.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Spooling
American Insulating Mach'y Co., Phila., Pa.
Boyd, Charles P. Corp., Philadelphia, Pa.
Eisler Engineering Co., Newark, N. J.
Emory, Robert J., Co., Newark, N. J.
Entwistle, Jas. L. Co., Pawtucket, R. I.
Modern Plastic Machinery Co., Lodi, N. J.
National Mach'y Exch. (Used), New York, N.Y.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Steel Equipment Co., Cleveland, Ohio.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury, Conn.
Watson Machine Co., Paterson, N. J.
Wean Equipment Corp., Cleveland, Ohio.
Wire & Textile Mach'y, Inc., Pawtucket, R. I.

MACHINERY—Spring Making
National Mach'y Exch. (Used), New York, N.Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Staple
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Straightening
Lewis Machine Co., The, Cleveland, Ohio.
Mettler Machine Tool Co., New Haven, Conn.
National Mach'y Exch. (Used), New York, N.Y.
Nilson, A. H. Machine Co., Bridgeport, Conn.
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Stranding
Hughesville Machine & Tool Co., Hughesville, Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Strip Steel
Ruesch, H. J., Machine Co., Newark, N. J.
Steel Equipment Co., Cleveland, Ohio.
Torrington Mfg. Co., Torrington, Conn.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Swaging
National Mach'y Exch. (Used), New York, N.Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Waterbury-Farrel Foundry & Machine Co. Waterbury, Conn.

MACHINERY—Taping
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.
Wire & Textile Machinery, Inc., Pawtucket, R.I.

MACHINERY—Testing Physical
Eberbach & Son Co., Ann Arbor, Mich.
Scott Testers, Inc., Providence, R. I.

MACHINERY—Testing Equipment—Sparkers
Davis, R. L. Elec. Co., Wallingford, Conn.
Dillon, W. C. & Co., Inc., Chicago, Ill.
Entwistle, Jas. L., Pawtucket, R. I.
Wire & Textile Machinery, Inc., Pawtucket, R.I.

MACHINERY—Tinning Wire
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Steel Equipment Co., Cleveland, Ohio.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Tinsel Rolling Mills
American Insulating Mach'y Co., Phila., Pa.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Trolley Wire
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Tube Mill
Ruesch, H. J., Machine Co., Newark, N. J.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Welding Wire
Eisler Engineering Co., Newark, N. J.
Micro Products Co., Chicago, Ill.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Winding
American Insulating Mach'y Co., Phila., Pa.
Eisler Engineering Co., Newark, N. J.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wind-up (Constant Tension, Variable Speed)
Industrial Ovens, Inc., Cleveland, Ohio.
Modern Plastic Machinery Co., Lodi, N. J.
Watson Machine Co., Paterson, N. J.

WHERE TO BUY, Continued

MACHINERY—Wire Bending
Eisler Engineering Co., Newark, N. J.
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

MACHINERY—Wire Drawing
American Insulating Mach'y Co., Phila., Pa.
Eisler Engineering Co., Newark, N. J.
Morgan Construction Co., Worcester, Mass.
National Mach'y Exch. (Used), New York, N.Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry & Mach. Co., Trenton, N.J.
Sleeper & Hartley, Inc., Worcester, Mass.
Steel Equipment Co., Cleveland, Ohio.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co. Waterbury, Conn.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Wire Forming
Eisler Engineering Co., Newark, N. J.
National Mach'y Exch. (Used), New York, N.Y.
Nilson Machine Co., A. H., Bridgeport, Conn.
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Wire Rope
New England Butt Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wood Screw
National Mach'y Exch. (Used), New York, N.Y.

MACHINERY—Wrapping Wire Coils
Angier Corporation, Framingham, Mass.

MATERIAL HANDLING EQUIPMENT
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

MATERIAL—Resistance Heating Strand
Trauwood Engineering Co., Cleveland, Ohio.

NAILS—Wire
American Steel & Wire Co., Cleveland, Chicago, New York
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Roebling, John A. Sons Co., Trenton, N. J.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire-Spencer Steel Division of Colorado Fuel & Iron Corp., Buffalo, N. Y.
U. S. Steel Export Co., New York, N. Y.

NICKEL SILVER AND PHOSPHOR BRONZE—Rod, Wire and Strip
Chase Brass & Copper, Waterbury, Conn.
Eastwood-Nealley Corp., Belleville, N. J.
Hudson Wire Co., Ossining, N. Y.

OVENS—Cable Lacquering
American Insulating Mach'y Co., Phila., Pa.
Industrial Ovens, Inc., Cleveland, Ohio.
Rockwell, W. S., Co., Fairfield, Conn.

OVENS—Dehydrogenizing
Carl-Mayer Corp., The, Cleveland, Ohio.
Industrial Ovens, Inc., Cleveland, Ohio.
Rockwell, W. S., Co., Fairfield, Conn.

OVENS—Industrial
Carl-Mayer Corp., The, Cleveland, Ohio.
Industrial Ovens, Inc., Cleveland, Ohio.
Rockwell, W. S., Co., Fairfield, Conn.
Ross, J. O., Engr. Corp., New York, N. Y.

OVENS—Welding Rod Coating
Carl-Mayer Corp., The, Cleveland, Ohio.
Industrial Ovens, Inc., Cleveland, Ohio.
Rockwell, W. S., Co., Fairfield, Conn.
Ross, J. O., Engr. Corp., New York, N. Y.

PAINTS—Heat Resisting
American Chemical Paint Co., Ambler, Pa.

PANS—Lead and Spelter
National Annealing Box Co., Washington, Pa.

PANS—Vulcanizing
Mossberg Pressed Steel Corp., Attleboro, Mass.

PAPER—Creped Wrapping
Angier Corp., The, Framingham, Mass.
Crepe-Kraft Company, The, Division National Waterproof Papers, Inc., Newark, N. J.

PAPER—For Coil Wrapping and Corrosion Prevention
Crepe-Kraft Company, The, Division National Waterproof Papers, Inc., Newark, N. J.

PAPER TESTERS—
Scott Testers, Inc., Providence, R. I.

PATENT ATTORNEYS—
Lancaster, Allwine & Rommel, Washington, D.C.

PICKLING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Oakite Products, Inc., New York, N. Y.
Parkin, Wm. M., Co., Pittsburgh, Pa.

PICKLING—Hooks, etc. Acid Resisting
Gordon, Clark E., Detroit, Mich.

PICKLING TANK LININGS—
Haveg Corp., Newark, Del.
Heil Process Equipment Corp., Cleveland, Ohio.
Sauereisen Cements Co., Pittsburgh, Pa.

PIPES & FITTINGS—Acid Resistant
Haveg Corp., Newark, Del.
Heil Process Equipment Corp., Cleveland, Ohio

PLASTIC TESTERS—
Scott Testers, Inc., Providence, R. I.

PNEUMATIC CYLINDERS
Entwistle, James L. Co., Pawtucket, R. I.

POTS—Lacquer
Industrial Ovens, Inc., Cleveland, Ohio

POTS—Lead Melting
National Annealing Box Co., Washington, Pa.
Robertson, John, Co., Brooklyn, N. Y.

POWDER—Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Magnus Chemical Co., Garwood, N. J.
Miller, R. H., Co., Inc., Homer, N. Y.
Oakite Products, Inc., New York, N. Y.
Potter, Neil C., Newark, N. J.
Standard Industrial Compounds Co., Inc., Chicago, Ill.

PRESSES—Hydraulic and Mechanical
Robertson, John, Co., Brooklyn, N. Y.

PRESSES—Lead
Robertson, John, Co., Brooklyn, N. Y.

PRESSURE VESSELS—
National Annealing Box Co., Washington, Pa.

PULLERS AND GRIPS—For Wire
Morgan Construction Co., Worcester, Mass.
Scudder, E. J., Fdry & Mach. Co., Trenton, N.J.
Sjogren Tool and Machine Co., Auburn, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wean Equipment Corp., Cleveland, Ohio.

PUMPS—Hydraulic
Robertson, John, Co., Brooklyn, N. Y.

REEL AND TENSION STANDS—
Davis, R. L. Electric Co., Wallingford, Conn.
Entwistle, James L., Co., Pawtucket, R. I.
Industrial Ovens, Inc., Cleveland, Ohio.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

REEL CRUTCHES—
Watson Machine Co., Paterson, N. J.

REELS & SPOOLS—Drawn Aluminum Alloy
Acrometal Products, Inc., Minneapolis, Minn.

REELS & SPOOLS—Annealing and Stranding
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Howsam Spool Co., Aurora, Ill.
Hubbard Spool Company, Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio.

REELS & SPOOLS—Collapsible
Entwistle, Jas. L. Co., Pawtucket, R. I.

REELS & SPOOLS—Steel
Apco Mossberg Co., Attleboro, Mass.
Clark, J. L., Mfg. Co., Rockford, Ill.
Howsam Spool Co., Aurora, Ill.
Hubbard Spool Company, Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio.

REELS AND SPOOLS—Shipping and Shop
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Bridge Mfg., Co., The, Hazardville, Conn.
Clark, J. L., Mfg. Co., Rockford, Ill.
Howsam Spool Co., Aurora, Ill.
Hubbard Spool Company, Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio.
North Anson Reel Co., North Anson, Maine

REELS—Metal Bound
Durkee Mfg. Co., Pine River, Minn.
Hubbard Spool Co., Chicago, Ill.
North Anson Reel Co., North Anson, Maine

REELS—Takeoff
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Bridge Mfg., Co., The, Hazardville, Conn.
Clark, J. L., Mfg. Co., Rockford, Ill.
Howsam Spool Co., Aurora, Ill.
Hubbard Spool Company, Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio.
North Anson Reel Co., North Anson, Maine

REELS—Vulcanizing & Impregnating
Apco Mossberg Co., Attleboro, Mass.
Howsam Spool Co., Aurora, Ill.
Hubbard Spool Company, Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio.

REELS—Wire Drawing
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Howsam Spool Co., Aurora, Ill.
Hubbard Spool Company, Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio.

REELS—Wire Mill
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Bridge Mfg., Co., The, Hazardville, Conn.
Durkee Mfg. Co., Pine River, Minn.
Howsam Spool Co., Aurora, Ill.
Hubbard Spool Company, Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio.
North Anson Reel Co., North Anson, Maine

REELS & SPOOLS—Wooden
Acrometal Products, Inc., Minneapolis, Minn.
American Woodworking Co., Chicago, Ill.
Bridge Mfg. Co., Inc., The, Hazardville, Conn.
Durkee Mfg. Co., Pine River, Minn.
North Anson Reel Co., North Anson, Maine

REFRACTORIES—High Temperature
Norton Company, Worcester, Mass.

RESISTANCE HEATING—Annealing, Patenting, Etc.
Trauwood Engr. Co., Cleveland, Ohio.

ROD BAKERS—
Carl-Mayer Corp., The, Cleveland, Ohio.
Rockwell, W. S., Co., Fairfield, Conn.
Ross, J. O., Engineering Corp., New York, N.Y.

RODS—Nickel Alloy
Eastwood Nealley Corp., Belleville, N. J.
International Nickel Co., Inc., New York, N.Y.

RODS—Stainless Steel
Armco Steel Corp., The, Middletown, Ohio.

RODS—Wire—Non-Ferrous
Eastwood Nealley Corp., Belleville, N. J.
Hudson Wire Co., Ossining, N. Y.
Platt Bros. & Co., The, Waterbury, Conn.

RODS—Wire, Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Indiana.
Keystone Steel & Wire Co., Peoria, Ill.
Roebling's John A., Sons Co., Trenton, N. J.
Youngstown Sheet & Tube Co., Youngstown, O.

WHERE TO BUY, Continued

ROPE—Wire
American Steel & Wire Company, Cleveland, Chicago, New York.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Roebling's John A., Sons Co., Trenton, N. J.
U. S. Steel Export Co., New York, N. Y.
Wickwire-Spencer Steel, Division of Colorado Fuel & Iron Corp., Buffalo, N. Y.

RUBBER AND RUBBER COMPRESSION TESTERS—
Scott Testers, Inc., Providence, R. I.

RUST PROOF COMPOUNDS—
(See Compounds—Rust Preventing)

RUST REMOVING COMPOUNDS—
(See Compounds—Rust Preventing)

SATURATION SYSTEMS—
Industrial Ovens, Inc., Cleveland, Ohio.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y Inc., Pawtucket, R. I.

SHEARS—
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

SHEET—Steel
Armco Steel Corp., The, Middletown, Ohio.
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Roebling's, John A., Sons Co., Trenton, N. J.
Youngstown Sheet & Tube Co., Youngstown, O.

SOAPS—Industrial and Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Bick, Hans C., Inc., Reading, Pa.
Magnus Chemical Co., Garwood, N. J.
Miller, R. H. Co., Inc., Homer, N. Y.
Potter, Neil C., Newark, N. J.
Standard Industrial Compounds Co., Inc., Chicago, Ill.
Swift & Company, Chicago, Ill.

SOLVENT RESIN SYSTEMS—Experimental
Industrial Ovens, Inc., Cleveland, Ohio.

STAMPINGS—Steel
Hubbard Spool Company, Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.

STRIP—Brass and Non-Ferrous
Chase Brass & Copper, Waterbury, Conn.
Hudson Wire Co., Ossining, N. Y.

STRIP—Steel
Armco Steel Corp., The, Middletown, Ohio.
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel & Carbide Corp., McKeesport, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.
Youngstown Sheet & Tube Co., Youngstown, O.

SWIFTS—Take-off
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Watson Machine Co., Paterson, N. J.

TANKS—Compound
Atlas Mineral Products Co. of Pa., Mertztown, Pa.
Haveg Corp., Newark, Del.
Watson Machine Co., Paterson, N. J.

TANKS—Pickling
Haveg Corp., Newark, Del.
Rockwell, W. S., Co., Fairfield, Conn.
Sauereisen Cements Co., Pittsburgh, Pa.

TANKS—Steel
Mossberg Pressed Steel Corp., Attleboro, Mass.
Rockwell, W. S., Co., Fairfield, Conn.
National Annealing Box Co., Washington, Pa.

TINSEL—Cords, Decorative
Hudson Wire Co., Ossining, N. Y.
Montgomery Co., The, Windsor Locks, Conn.
North American Philips Co., Inc., New York, New York

TINSEL—Electric Conductor
Hudson Wire Co., Ossining, N. Y.
Montgomery Co., The, Windsor Locks, Conn.
North American Philips Co., Inc., New York, New York

TINSEL—Electric Resistance
Hudson Wire Co., Ossining, N. Y.
Montgomery Co., The, Windsor Locks, Conn.
North American Philips Co., Inc., New York, New York

TINSEL—Lame, Silver and False Gold
Hudson Wire Co., Ossining, N. Y.
Montgomery Co., The, Windsor Locks, Conn.
North American Philips Co., Inc., New York, New York

TINSEL—Thread, Silver and False Gold
Hudson Wire Co., Ossining, N. Y.
Montgomery Co., The, Windsor Locks, Conn.
North American Philips Co., Inc., New York, New York

TINSEL—Thread, Decorative
Hudson Wire Co., Ossining, N. Y.
Montgomery Co., The, Windsor Locks, Conn.
North American Philips Co., Inc., New York, New York

TOOLS—Wire Cutting
Porter, H. K., Inc., Everett, Mass.

TRAMRAIL SYSTEMS—
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

TRAVERSES—For Reels
Entwistle, James L. Co., Pawtucket, R. I.
Hubbard Spool Company, Chicago, Ill.
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio.

TRAVERSE MECHANISMS—
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.
New England Butt Co., Providence, R. I.
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc., Pawtucket, R. I.

TUBE BENDERS AND FORMERS—
O'Neil-Irwin Mfg. Co., Lake City, Minn.
Ruesch, H. J., Machine Co., Newark, N. J.

VALVES AND FITTINGS—Acid Resistant
Haveg Corp., Newark, Del.

VARNISHES—For Insulation
General Electric Co., Schenectady, N. Y.

VULCANIZERS—
Watson Machine Co., Paterson, N. J.

VULCANIZING PANS—
American Insulating Mach'y Co., Phila., Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.

WELDERS—Spot and Butt
Eisler Engineering Co., Newark, N. J.
Micro Products Co., Chicago Ill.

WIND-UP AND UNWIND SYSTEMS—Continuous
American Insulating Mach'y Co., Phila., Pa.
Davis R. L. Electric Co., Wallingford, Conn.
Entwistle, James L., Co., Pawtucket, R. I.
Industrial Ovens, Inc., Cleveland, Ohio.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc., Pawtucket, R. I.

WIRE—Aluminum
Aluminum Co. of America, Pittsburgh, Pa.
Malin & Co., Cleveland, Ohio.

WIRE—Cast
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Cold Heading
Armco Steel Corp., The, Middletown, Ohio.
American Steel & Wire Co., Cleveland-Chicago, New York.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Roebling's, John A., Sons Co., Trenton, N. J.
U. S. Steel Export Co., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Electric
Chase Brass & Copper, Waterbury, Conn.
Hudson Wire Co., Ossining, N. Y.
Malin & Co., Cleveland, Ohio.

WIRE—Enameled for Coils
North American Philips Co., Inc., New York, New York
Winsted Div. of Hudson Wire Co., Winsted, Conn.

WIRE—Manufacturers
Armco Steel Corp., The, Middletown, Ohio.
American Steel & Wire Co., Cleveland-Chicago, New York.
Bethlehem Steel Co., Bethlehem, Pa.
Chase Brass & Copper, Waterbury, Conn.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel & Carbide Corp., McKeesport, Pa.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Keystone Steel & Wire Co., Peoria, Ill.
Roebling's, John A., Sons Co., Trenton, N. J.
Tennessee Coal, Iron & R. R. Co., Birmingham, Ala.
U. S. Steel Export Co., New York, N. Y.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Spencer Steel Div. of Colorado Fuel & Iron Corp., Buffalo, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Music
American Steel & Wire Co., Cleveland-Chicago, New York
Columbia Steel Co., San Francisco, Calif.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Malin & Co., Cleveland, Ohio.
U. S. Steel Export Co., New York, N. Y.
Wickwire-Spencer Steel Division of Colorado Fuel & Iron Corp., Buffalo, N. Y.

WIRE—Nickel & Nickel Alloy
Eastwood-Nealley Corp., Belleville, N. J.
International Nickel Co., Inc., New York, N.Y.

WIRE—Nickel Silver and Phosphor Bronze
Chase Brass & Copper, Waterbury, Conn.
Eastwood-Nealley Corp., Belleville, N. J.
Hudson Wire Co., Ossining, N. Y.
Malin & Co., Cleveland, Ohio.

WIRE—Non-Ferrous to Specification for Special Purposes
Chase Brass & Copper, Waterbury, Conn.
Eastwood-Nealley Corp., Belleville, N. J.
Hudson Wire Co., Ossining, N. Y.
North American Philips Co., Inc., New York, New York.
Winsted Div. of Hudson Wire Co., Winsted, Conn.

WIRE—Spring
American Steel & Wire Co., Cleveland-Chicago, New York.
Armco Steel Corp., The, Middletown, Ohio.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Indiana.
Firth-Sterling Steel & Carbide Co., McKeesport, Pa.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Keystone Steel & Wire Co., Peoria, Ill.
U.S. Steel Export Co., New York, N. Y.
Wickwire-Spencer Steel Division of Colorado Fuel & Iron Corp., Buffalo, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Stainless Steel
Armco Steel Corp., The, Middletown, Ohio.
American Steel & Wire Co., Cleveland-Chicago, New York
Columbia Steel Co., San Francisco, Calif.
Firth-Sterling Steel & Carbide Corp., McKeesport, Pa.
Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.
U. S. Steel Export Co., New York, N. Y.

WIRE—Steel—Also Coppered Steel—Also Galvanized Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Indiana.
Firth-Sterling Steel & Carbide Corp., McKeesport, Pa.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Keystone Steel & Wire Co., Peoria, Ill.
U. S. Steel Export Co., New York, N. Y.
Wickwire Brothers, Inc., Cortland, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Straightening and Cutting—
Pittsburgh Cut Wire Co., Pittsburgh, Pa.
Wickwire Brothers, Inc., Cortland, N. Y.

WIRE—Zinc
Platt Bros. & Co., The, Waterbury, Conn.

WIRE CLOTH—Industrial
Roebling's John A., Sons Co., Trenton, N. J.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire-Spencer Steel Division of Colorado Fuel & Iron Corp., Buffalo, N. Y.

WIRE TESTERS—
Scott Testers, Inc., Providence, R. I.

WIRE, WEAVING—Non-Ferrous
Chase Brass & Copper, Waterbury, Conn.
Hudson Wire Co., Ossining, N. Y.

WRAPPING PAPER—Creped
Angier Corporation, Framingham, Mass.
Crepe-Kraft Company, The, Division National Waterproof Papers, Inc., Newark, N. J.

YARNS & TAPES—
Du Pont de Nemours, E. I., Co., Wilmington, Delaware
General Electric Co., Schenectady, N. Y.
Owens Corning Fiberglas Corp., Toledo, Ohio.
Twitchell, E. W., Philadelphia, Pa.

YARN TESTERS—
Scott Testers, Inc., Providence, R. I.

The WATSON MACHINE COMPANY

ESTABLISHED 1845

PATERSON 3, NEW JERSEY, U. S. A.

WATSON

ELECTRICAL WIRE AND CABLE AND WIRE ROPE MACHINERY

WATSON BUNCHER "V-7"

The Most Compact, High Production, Low Cost, Vertical Unit in World-Wide Use.
AN IDEAL PRODUCER OF CORD CORES, ANTENNA WIRES, METAL FISH LINES, TWISTED INSULATED CONDUCTORS AND STRAND OF ANY METAL OR LINEAR PRODUCT ABLE TO ABSORB TORSION.

ALL ELECTRICAL EQUIPMENT INSTALLED AND WIRED FOR OPERATION

DOUBLE ELECTRIC STOP SYSTEM

1800 TWISTS Per Minute

STANDARD No. 7 16" x 8" x 8" TAKEUP REELS

TWO LAY RANGES 30 POSSIBLE LAYS From 1/8" to 2 1/4"

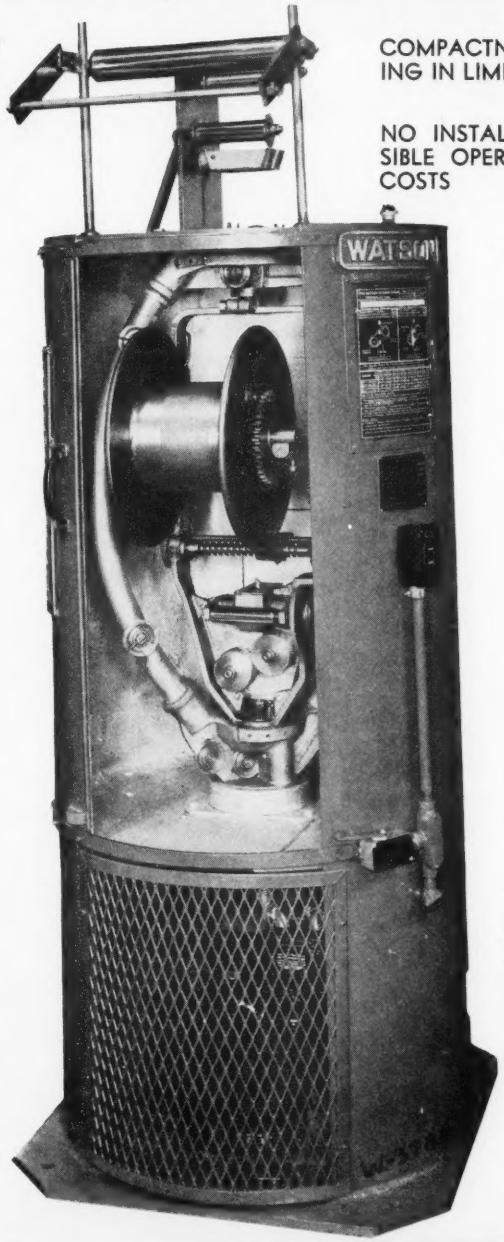
DETACHABLE and INTERCHANGEABLE CAPSTAN - DRIVE - UNITS Allow Rapid Changes of Lay Range and Hand of Twist

WIRE FEED FROM ANY DIRECTION

DYNAMICALLY BALANCED FLYER

* * *

Request our MACHINERY BULLETIN 010749



COMPACTNESS PERMITS ROW-MOUNTING IN LIMITED SPACE

NO INSTALLATION AND LOWEST POSSIBLE OPERATING AND MAINTENANCE COSTS

BASE ONLY 32" x 32"

ALL STEEL and BALL BEARING CONSTRUCTION

FULLY GUARDED MECHANISM IN TUBULAR MACHINE FRAME

ELECTRIC STOP DOOR SAFETY

FULLY AUTOMATIC "CURRENT OFF" BRAKE

ADJUSTABLE MULTI-DISC SLIP FRICTION

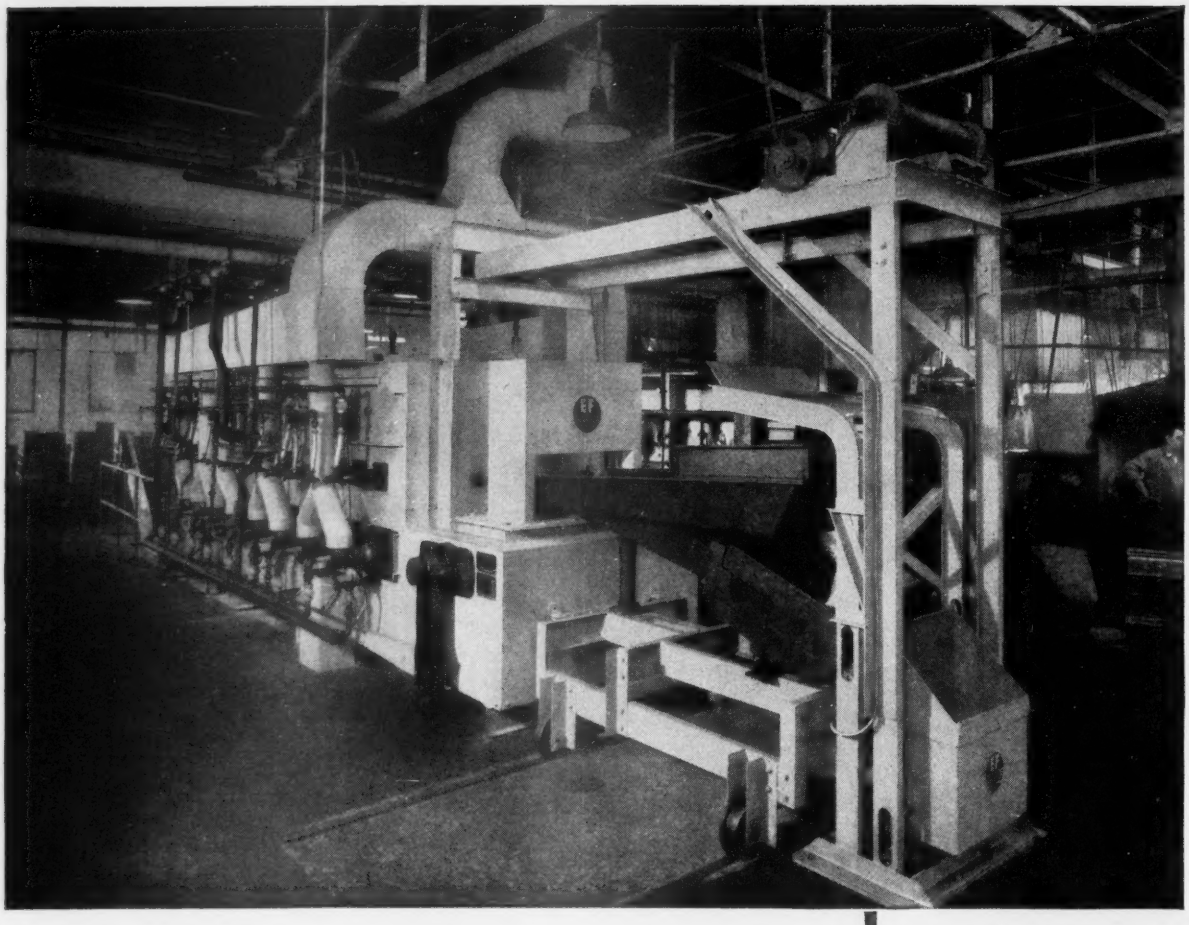
OIL HOUSED GEARING

WEIGHTS:

Net	1200#
Skidded	1300#
Crated	1450#
Boxed (150 cu. ft.)	1750#

* * *

Deliveries from Stock available during APRIL 1949



LOW COST HEAT TREATMENT

of small and medium size parts

● The EF chain belt conveyor furnace—with its specially designed heat resisting cast link conveyor belt—is one of the most satisfactory continuous heat treating units yet devised for the scale-free hardening, carbon restoration and non-decarb heat treating of small and medium size parts. Ideally used with bolts, chains, gears, pinions, rivets, tools, tractor treads and a wide variety of other forged, drawn, stamped, machined, headed and welded pieces. Built in eleven standard sizes with capacities up to 2000 pounds per hour. Larger sizes also available. Gas fired, oil fired or electrically heated, whichever best suits your particular requirement—and location. Estimates of equipment, installation and operating costs—and samples of heat treated parts—furnished promptly. Write for literature today.

EF

GAS-FIRED
OIL-FIRED
and ELECTRIC

FURNACES

for

- AGING
- ANNEALING
- BRAZING
- ➧ CARBON RESTORATION
- CARBURIZING
- CERAMIC DECORATING
- DRAWING
- ➧ HARDENING
- HOMOGENIZING
- MALLEABLIZING
- NORMALIZING
- NITRIDING
- SINTERING
- SOLUTION TREATING
- ➧ SPECIAL ATMOSPHERE TREATMENTS

EF

THE ELECTRIC FURNACE CO.

GAS FIRED, OIL FIRED AND ELECTRIC FURNACES
FOR ANY PROCESS, PRODUCT OR PRODUCTION

WILSON STREET
Salem - Ohio